Vermont Telecommunications Plan

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VERMONT

Prepared by the Department of Public Service
112 State Street
Montpelier, VT 05620-2601
(802) 828-2811
TTY (VT): 800-734-8390
psd.telecom@state.vt.us
http://publicservice.vermont.gov

Vermont Telecommunications Plan 2014

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Executive Summary

Introduction

The telecommunications market in Vermont is a competitive environment in which most consumers have choice between two or more service providers and platforms to meet their telecommunications needs. Vermont, much like the rest of the nation, has witnessed great technological and economic change in the communications industries—change that touches almost every aspect of life in Vermont, from healthcare to political engagement. As Vermont heads into the future, it must consider the challenges and opportunities the current telecommunications landscape presents. This document considers the range of issues affecting the provision of telecommunications, video, and Internet service in Vermont, as well as the policy considerations affecting each service. This document puts forward the general objective of ensuring that every Vermonter has access to quality, reliable, and affordable communications services.

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The Department of Public Service is a unit of the executive branch of Vermont state government, and is charged with representing the public good in energy, telecommunications, water, and wastewater utility matters before the Public Service Board (PSB). The Department exercises regulatory authority over telephone service, prices, and service quality; cable service; and wireless telecommunications facilities. In addition, the Department has played an active role in facilitating the state's recent broadband expansion efforts. Vermont law directs the Department to prepare and periodically revise a telecommunications plan covering a ten-year period. The Plan must consider a host of statutory goals, including strengthening the universal availability and affordability of telecommunications services, supporting the availability of modern mobile services, providing the benefits of future advancements in technology to Vermont residents, and supporting competitive choice for consumers.[1] It is with this mandate in mind that the Department publishes this *Vermont Telecommunications Plan 2014*.

The Plan has three primary objectives. First, the Plan is intended to inform Vermont residents and policy makers of the current state of telecommunications services, infrastructure, and regulation in Vermont. The Plan explores how technological advances and shifts in consumer demands have caused significant changes in how telecommunications companies invest in infrastructure and how residents use their services.

Second, the Plan presents readers with future challenges facing the state in providing telecommunications. The major challenge facing Vermont is the ability of service providers to continue to serve and expand capability in rural areas. As this Plan demonstrates, market forces, technological advancements, and national regulatory policies have caused disruption and dysfunction in the telecommunications industry. As the state looks to the

1. 30 V.S.A. § 202c.

future, the state must overcome challenges affecting the provision of basic telephone and broadband service in highly rural areas.

Lastly, the Plan suggests policies and initiatives to help Vermont attain its telecommunications objectives. While demand for telecommunications services are greater than ever, the state's authority to regulate the market has waned. The state has adopted an incentive based framework, in which it encourages the build-out of infrastructure through grants, expeditious permitting of facilities, and other inducements. As the state looks to the future, it must grow existing private-public partnerships and create new relationships. The Plan outlines ten desired goals and the strategies the state should employ to meet those goals.

While demand for telecommunications services are greater than ever, the state's authority to regulate the market has waned.

Current State of Voice, Internet Access, and Video Industries

Technology and Market Trends: 2004–2014

When the *Telecommunications Act* was signed into law in 1996, the Public Switched Telephone Network (PSTN) and the Internet were nearly completely separate.[2] Voice service over the PSTN was the only plausible definition of an "essential" service.[3] This remained largely true at the publication of the Department's *2004 Telecommunications Plan* when competition in the telephone market was still establishing itself. But technological changes over the last 10 years have blurred the line between what is an essential service and what is not. One significant change is the use of packet switching to carry voice data in the same way that information data is transmitted.

The dominant packet switching technology, voice over Internet protocol (VoIP), has allowed a greater number of competitors to enter the voice market, such as cable and Internet content companies. Some companies provide voice service to fixed locations over internally managed Internet protocol (IP) networks, while other providers use IP technology to send voice traffic over the public Internet (nomadic VoIP).[4] More importantly, VoIP has challenged the distinction between "telecommunications service" (or "basic service") and an enhanced "information service."[5] Because federal law distinguishes between telecommunications and information services, and regulates each one differently, the rise of VoIP raises an important question about what is a telecommunications service. The transition from traditional circuit switched technology to IP technology is

2. Jonathan Nuechterlein & Paul J. Weiser, *Digital Crossroads: American Telecommunications Policy in the Digital Age*, at 231 (2d ed. 2013).
3. Peter Bluhm & Rohert Loube, *Vermont Universal Service Goals and Policy Options* at 3, 35 (2014). Authors Bluhm and Loube argue that services other than telephony may be essential, but that it is up to states to decide.
4. Department of Public Service, *Vermont Telecommunications Plan* at 1-6 (2004).
5. States have regulatory authority over intrastate telecommunications services, but are generally preempted from regulating interstate information services. *See In re Investigation into Internet Protocol (VoIP) Services*, 2013 VT 23, ¶ 6. Federal Law gives the U.S. Department of Commerce and the Federal Communications Commission limited authority over Broadband service. 47 U.S.C §§ 1302 et. seq.

inevitable, and the roles that states and the national government play in this transition will be crucial to determining basic questions about quality, reach, and affordability of basic voice service in the future.

The voice telephony market has changed in other ways. Commercial Mobile Radio Service (cellular service) has become a dominate technology in the telecommunications industry over the past decade. The *2004 Telecommunications Plan* survey indicated that an overwhelming majority of Vermont households (77%) had not even considered the idea of giving up their traditional landline service in favor of wireless service. Today, 29.9% of Vermont adults live in wireless-only households, and that number continues to increase as service expands and becomes more reliable.[6] Recent consolidation of the wireless market has resulted in four nationwide carriers offering service in Vermont. These carriers have made great inroads into rural Vermont, installing facilities in some of the hardest to reach places of the state. The result has been that Vermonters increasingly rely on their wireless devices to communicate.

The other area of great change has been in the nationwide adoption and use of Internet technology. The Internet, which was once considered an exclusively academic pursuit, is now an essential component of modern life. In 2004, only 27% of Vermont households subscribed to broadband (high speed) Internet service. By 2012, 76% of Vermont households subscribed to high speed Internet.[7] This increase in adoption has been the direct result of an increasing supply of Internet applications, as people now use their connection to watch video, access social media, write emails, work from home, and much more. The Internet has become essential to participating in the modern economy. Small and large businesses rely on the Internet to sell goods and services. Job seekers use it to search for employment. As more Vermonters continue to adopt and use the Internet, broadband Internet access will play an increasing role in the economic success of Vermont.

Ten years ago, only 75% of the state's locations had high speed internet access available, defined then as 768 kilobits per second (kbps) download and 200 kbps upload. In the *2011 Telecommunications Plan*, the state put forward a goal of ubiquitous availability of broadband at 768/200 kbps with service at 10 megabits per second (Mbps) available to most locations by 2013. The state met this goal, thanks to the investments and hard work of Vermont service providers and state leaders. Key investments from private partners, federal stimulus, and state capital appropriations have yielded great success in the expansion of basic broadband service. Today, service is available at 99% of locations within the state, with the remaining 1% having a funded solution in place. Seventy five percent of households have access to speeds of four Mbps download and one Mbps upload, or faster.

99%

BROADBAND SERVICE

Today, broadband service is available at 99% of locations within the state, with the remaining 1% having a funded solution in place.

6. Blumberg SJ, Ganesh N, Luke JV, Gonzales G. Wireless substitution: State-level estimates from the National Health Interview Survey, 2012. National health statistics reports; no 70. Hyattsville, MD: National Center for Health Statistics. 2013.

7. High speed is defined as 768 Kbps download and 200 Kbps upload. 2012 Vermonter Poll, Center for Rural Studies (Discussed *Infra* at Chapter 2).

While broadband subscription rates have increased, Vermont cable companies have experienced a corresponding decline in cable subscriptions. The *2004 Telecommunications Plan* noted a moderate increase in cable availability as cable operators expanded their plants. In recent years, however, cable subscription has been on the decrease. In 2009, the number of in-state cable connections peaked at 139,275. As of 2012, there were 132,373 connections, and that number is expected to trend downward as consumers abandon cable in favor of Internet hosted video content. The decline in cable subscriptions will likely not be fatal to cable companies, especially those that offer telephone and broadband service. However, the decline in subscriptions does present funding challenges for public access television, because public access stations derive their funding from revenue generated by cable video subscriptions. Declining subscriptions have resulted in lower funding amounts for public access stations.

Universal Service and Intercarrier Compensation Reform

Universal service was, and still is, the cornerstone of telecommunications regulatory policy in the United States. Universal service is the idea that telephone service should be available to everyone. Both the state and federal government further this policy by managing universal service funds. The federal Universal Service Fund benefits four programs—Lifeline, Rural Healthcare, Schools and Libraries (E-Rate), and the Connect America Fund (formally the high cost fund)—all of which are aimed at managing cost and increasing telephone penetration. In 2011, having declared providing high speed Internet access to be the "universal service challenge of our time," the Federal Communications Commission (FCC) set about the largest reform of the Universal Service Fund since the *1996 Telecommunications Act*. The FCC order, known as the *Transformation Order*, made two fundamental changes. It reformed interstate and intrastate inter-carrier compensation rules, and it redirected universal service support to the deployment of broadband in unserved areas of the nation.

Universal service was, and still is, the cornerstone of telecommunications regulatory policy in the United States.

The *Transformation Order* gradually eliminates high cost support to price cap carriers, such as FairPoint, and provides broadband support through the newly created Connect America Fund (CAF).[8] The *Transformation Order* froze support for high cost support price-cap carriers and replaced high cost support with money tied directly to the build out of broadband facilities and the provision of broadband service.[9] Through a series of "phases" over a period of time the FCC will distribute different sums of money, which will have various achievement goals and will be available to different sets of participants.

At the state level, changes in the Vermont Universal Service Fund (VUSF) provide a support mechanism similar to the CAF. The purpose of the VUSF is to support the Vermont Telecommunications Relay Services, telephone Lifeline Assistance, and the development of state-wide enhanced

8. The *Transformation Order* also reformed intercarrier compensation, a topic discussed in Chapter 1 of this Plan.

9. The FCC made modest changes to support for rate-of-return carriers, which includes most Vermont ILECs.

Emergency 911 (E-911) service. To finance these programs, Vermont law imposes a broad based charge ("VUSF charge") on all telecommunications services that interact with the PSTN.

The Vermont General Assembly added the Connectivity Fund to the menu of VUSF funded programs in 2014. Vermont service providers may now bid on grants through the VUSF to fund broadband expansion projects. The same legislation also created the Division of Connectivity to be under the aegis of the Agency of Administration. Its goal is to promote broadband service expansion within the state. The Division of Connectivity will have the ability to apply for support through the VUSF and will help direct state efforts to expand broadband service.

The America Recovery and Reinvestment Act

The 2008 financial crisis caused profound changes to American society, many of which negatively impacted working families. However, Governor Shumlin, Vermont's Congressional Delegation, and Vermont's telecommunications industry leaders positioned the state competitively with regard to opportunities created by the recession. The largest opportunity the state benefited from was funding provided through the *America Recovery and Reinvestment Act* (ARRA). In 2009 Congress made available an unprecedented $813 billion in stimulus funding. This funding included many infrastructure projects to improve roads, electricity networks, and telecommunications infrastructure, among others.

The Vermont Telephone Company (VTel) was Vermont's largest recipient of ARRA funds, receiving funds to build a state-wide wireless network, fiber to the home in its landline service territory, and a statewide fiber backhaul project. Green Mountain Power (GMP), Vermont's largest electric utility, also received ARRA funding, which it used to upgrade and expand VTel's wireless network. Through a partnership with VTel, GMP will utilize this wireless network as part of its smart grid network. The Vermont Telecommunications Authority (VTA) also applied for, and received, ARRA funding, which it sub-awarded to Sovernet to build out its middle mile fiber network. Once complete, these projects will provide important benefits to Vermont residents and businesses, especially those in rural areas. It is important to note that the amount of federal stimulus awarded to Vermont entities was unprecedented and unlikely to be repeated in the foreseeable future.

The Challenges Ahead

The changes described above present Vermont with three fundamental challenges. First, Vermont will need to grapple with the question of how to increase the speed of available broadband services. Second, Vermont will be faced with the challenge of maintaining basic voice service in rural areas. Lastly, changes in how consumers use services will require rethinking about how content is delivered in the multi-channel video industry. Questions about public access, retransmission costs, and the viability of the existing cable model will turn on consumers' expectations for broadband and video services.

As discussed above, providing broadband service in rural areas is costly. National reform of the Universal Service Fund will help bring a basic level of service to rural areas. This support is contingent upon Vermont service providers accepting broadband specific universal service obligations. Furthermore, this support is unlikely to bring every Vermonter the level of service necessary for the state to remain economically competitive.

The goal announced in the *Vermont Telecommunications Plan 2011: Broadband* was to ensure that every address[10] in Vermont has access to broadband with the minimum technical requirements of four Mbps download and one Mbps upload by year end 2020. Also, by year end 2020, a majority of addresses in Vermont should have access to a broadband connection with speeds of at least 100 Mbps download and 100 Mbps upload. These speeds exceed the capabilities of existing deployed technology. In many cases this will mean procuring fiber to the node (FTTN) or fiber to the home (FTTH) in rural, high cost areas. As Vermont looks to the future, it must determine the efficacy of maintaining or increasing these benchmarks.

Support for basic voice service has diminished since the *Transformation Order*. Vermont will be faced with hard questions about how to supply service in high cost, unprofitable areas. Additionally, incumbent local exchange carriers (ILECs) face fierce competition in the denser, more profitable regions of the state. One report written on behalf of the Department of Public Service called Vermont a "daunting place to provide service," noting that in 2011 all Vermont ILECs reported an aggregate net operating loss of $39 million.[11] The same report predicted continuing losses for the foreseeable future. Yet, despite high costs and line losses, every ILEC has an obligation, as carrier of last resort, to make service available at every location in its territory. To ensure that service continues in all areas of the state, Vermont will need to formulate policies that will encourage telecommunications providers to retain and expand voice service in high cost areas.

Lastly, changes in ways video content is delivered to consumers have caused disruption in the multichannel video industry. Consumers are increasingly migrating to Internet-based content providers and are increasingly watching content "on demand." A decline in cable subscription rates has meant a decline in revenues for public access television stations. A decrease in viewership means the relevance of public access through cable is called into question. As the state contemplates cable video policy, it should assess the value of public access television to consumers, and think about how consumers should pay for that content.

The goal... was to ensure that every address in Vermont have access to broadband with the minimum technical requirements of four Mbps download and one Mbps upload by year end 2020.

10. "Address" means E-911 residential and business locations.
11. The FCC made modest changes to support for rate-of-return carriers, which includes most Vermont ILECs.

Vision

While the state's regulatory authority over telecommunications has diminished, its interest in maintaining affordable and reliable service has not. As this Plan looks to the state's telecommunications future, it is important to have a sense of what that future should look like. The Department views the following goals as an essential part of supporting and growing a reliable telecommunications network throughout the state of Vermont.

1. **Broadband Speed.** Every address[12] in Vermont should have broadband Internet access with the minimum technical requirements of 4 megabits per second (Mbps) download and 1 Mbps upload. By year end 2020, a majority of addresses in Vermont should have access to the Internet at speeds of at least 100 Mbps symmetrical, and every address should have access to speeds of at least 10 Mbps download. By 2024, every address should have broadband with minimum technical requirements of 100 Mbps symmetrical.

2. **Broadband Deployment.** Every address in Vermont should have access to wired and wireless broadband Internet access service.

3. **Affordability.** Broadband service should be affordable to all customer classes.

4. **Local Public Generated Content.** The state should promote locally generated content that is used and useful to communities.

5. **Adoption and Usage.** Vermont should support the universal adoption and use of broadband service at home and at work.

6. **Mobile Service.** Vermont should have universal availability of mobile service along travel corridors and near universal availability statewide.

7. **Basic Service.** Vermont should have reliable, economical telephone service in all areas of the state, including rural areas. All residents, regardless of income or location, should have access to basic telephone service.

8. **Enhanced 911.** Vermont should have available the best possible E-911 service. The state should endeavor to find greater efficiencies within the e-911 system while maintaining and enhancing public safety.

9. **Competition.** Vermont's telecommunications marketplace should be competitive, and all Vermonters should reap the benefits of competition.

10. **Regulatory Fairness.** Like services should be regulated alike, regardless of the platform or technology used to provide the service.

12. "Address" means E-911 residential and business locations.

To meet Vermont's telecommunications goals, the following strategies should be pursued:

1. Vermont should **provide universal service support for broadband build out projects.** Vermont should require that all projects receiving public monies meet the minimum technical objectives set by the Department of Public Service.

2. Vermont should **encourage the expansion of commercial mobile radio service** by maintaining the existing permitting process for telecommunications facilities.

3. Vermont should **continue its wireless and broadband mapping initiatives** with or without federal support.

4. Vermont, through the Public Service Board, should **examine existing cable line extension rules, and the pole attachment dispute resolution process.**

5. Vermont should **assess the value of public access stations to the communities they serve** and explore new ways in which local content can be cost effectively generated and disseminated to consumers.

6. The Department of Public Service and Public Service Board **should continue a regulatory framework that facilitates competition,** while assuring affordable basic service rates, high quality of service, consumer protection, and universal service.

7. Vermont policy makers should carefully **consider the potential negative outcomes of state and municipalities directly competing with private firms in the provision of telecommunications services,** especially in areas where consumers are adequately served. Vermont should refrain from policies, including financial incentives, that have the net effect of diminishing competitive choice in the marketplace.

8. The state should **refrain from enacting laws that regulate like services differently.** Vermont policy makers should advocate for national reform measures that regulate substitutable platforms similarly. As cross-platform competition increases, the state and national regulatory framework should equally regulate all service providers without regard to the way in which service is provisioned.

9. Vermont should **stimulate demand for broadband service by promoting skills training programs and instituting policies for reducing the cost of broadband service** for low income families.

How this Plan is Organized

Vermont law directs the Department to prepare a plan addressing five subjects. This document follows that format, providing readers with chapters that address the statutory criteria in turn, along with additional information on the cost of deploying state-of-the-art broadband

infrastructure statewide. Chapter One describes the future needs of Vermont's telecommunications infrastructure, looking ten years into the future. This chapter also discusses relevant events of the last ten years, and how those events have shaped the present. Chapter Two is the Telecommunications Almanac. Chapter Two describes current telecommunications infrastructure and services. Chapter Two also provides a comparative analysis of Vermont relative to other states. Chapter Three is a report, prepared by the Department of Information and Innovation, that describes the telecommunications infrastructure needs of state government. Chapter Four provides a cost analysis for the statewide expansion of broadband service that meets the state's 2024 goal of a 100 Mbps symmetrical connection to every Vermont residential and business location. Chapter Five outlines the state's policy goals and strategies for the next ten years. This section outlines a vision of what Vermont's telecommunications systems ought to be and how Vermont can build them. This Plan also outlines aggressive, but realistic, strategies for making this Plan's vision a reality.

CHAPTER 1

An Overview of Past, Current, and Future Telecommunications Trends in Vermont

Introduction

Vermont law requires the Department to give an overview of future requirements for telecommunications services that looks ten years into the future.[13] This overview must consider services needed for economic development, technological advances, and other trends and factors which, as determined by the Department "will significantly affect State telecommunications policy and programs."[14] This chapter responds to that mandate. Below are separate discussions of the three major services—voice, Internet access, and video—which relate to telecommunications infrastructure and development. This chapter provides an overview of trends over the last ten years and likely future market trends.

Voice

Vermont's telecommunications market has grown more competitive in the last ten years with the entrance of competitive local exchange carriers (CLECs), explosive growth of mobile wireless telephone service, and telephone service being offered from cable providers. In urban and suburban areas such as Chittenden County, this influx of competition has resulted in greater choice of services for businesses and residents. Most Burlington residents for instance may now choose between at least three landline voice service carriers. In addition, many consumers have canceled landline phone service in favor of mobile radio or other service.

Voice over Internet protocol (VoIP) is poised to replace circuit switched technology with a voice system that rides over data networks.

Competition, however, is less abundant in rural areas. Incumbent local exchange carriers (ILECs) are very often the only wireline provider in the state's costliest to serve areas and act as the carrier of last resort (COLR). ILECs are losing lines in Vermont's profitable, urban areas. At the same time, these carriers are experiencing reductions in high cost support. In the past, federal Universal Service support was provided for voice service in high-cost areas. FCC changes indicate that the money will be redirected to support the provision of broadband. These two trends put great financial stress on ILECs, as they try to maintain an aging network for a dwindling number of customers.

Technological changes are also affecting the voice market. Voice over Internet protocol (VoIP) is poised to replace circuit switched technology with a voice system that rides over data networks. Telephone providers

13. 30 V.S.A. § 202d (b) (1).
14. *Id.*

all over the country are seeking more cost effective ways to bring service to consumers. In some rural areas this may mean abandoning traditional wireline service altogether in favor of a wireless solution. The great challenge moving forward will be addressing the cost of service in rural areas.

An Overview of the Vermont Voice Market

Vermont is served by ten ILECs. The incumbent carriers are FairPoint Vermont, Inc., Franklin Telephone Company, Ludlow Telephone Company (TDS Telecom), Northfield Telephone Company (TDS Telecom), Perkinsville Telephone Company (TDS Telecom), Shoreham Telephone, LLC (OTT Communications), Telephone Operating Company of Vermont LLC (FairPoint Communications), Topsham Telephone Company, Vermont Telephone Company (VTel), and Waitsfield–Fayston Telephone Co., Inc.[15] These companies have designated service territories and are obligated to make service available to every location in their territory. Incumbent carriers must file tariffs with the Public Service Board and adhere to service quality standards.[16] Telephone Operating Company of Vermont is Vermont's successor Regional Bell Operating Company (RBOC). Both FairPoint companies are price-cap carriers under state and Federal law. The eight "independent" ILECs are treated as rate of return carriers for purposes of federal law and are designated as "small eligible telecommunications carriers" by the Public Service Board, allowing them to receive Universal Service Fund support.[17]

Vermont is also served by several facilities based CLECs. CLECs are not rate regulated and have no imposed service territory.[18] CLECs lease facilities of a phone company or co-locate equipment within ILEC owned central offices. Facilities based CLECs also include cable operators, which offer voice service through their cable network, and wireless Internet service providers (WISPS).

Voice competition exists throughout the state, but is not evenly distributed. Urban centers and suburban areas generally have multiple carriers. ILECs face competition from several facilities based providers. Most cable companies now offer voice service, and cable networks reach an estimated 67.5% of E-911 locations in Vermont.[19] Three of the four national wireless providers also have a presence in Vermont, reaching an estimated 96% of the state's geographic area. Within urban centers, ILECs experience intense competition from these providers, which can offer lower cost services. Rural areas have a less developed telephone market. In many rural exchanges, ILECs are the only landline carrier. In an estimated 22-25% of the state's addresses, the designated ILEC is the only landline option for voice service.

22-25%

OF STATE ADDRESSESES

In an estimated 22-25% of the state's addresses, the designated ILEC is the only landline option for voice service.

15. A service territory map is located in Appendix 2 of this publication.
16. As directed by 30 V.S.A. §§ 225, 226 and 227d.
17. By providing written notice to the Public Service Board, a small ETC may elect to be exempted from one or more of Vermont's tariffing requirements. See 30 V.S.A. 227d.
18. While not rate regulated, basic common carriage principles still apply.
19. E-911 location any building designated as an E-911 location. This does not represent a count of addresses cable companies serve. This analysis is based on data provided to the Department of Public Service by cable companies as part of the broadband mapping Initiative.

Verizon/NYNEX Sale

Vermont has experienced a great deal of activity in the wireline telephone market over the past ten years. At the publication of the *2004 Telecommunications Plan*, Verizon New England owned the geographically largest telephone territory in New England. In 2007, Verizon sought to sell its lines in Vermont, New Hampshire, and Maine. FairPoint Communications, Inc., a North Carolina based corporation, agreed to purchase Verizon's lines for $2.7 billion, of which approximately $1 billion were in the form of FairPoint stock transferred to Verizon shareholders.

The Public Service Board approved the sale in February of 2008.[20] Although the Board expressed concern over the level of financial risk that FairPoint agreed to assume, the Board concluded that FairPoint's intention to expand broadband service, coupled with a commitment to improve service quality, would, on balance, benefit the public. The Board noted that Verizon's lack of interest in operating a wireline business in Vermont and its unwillingness to deploy fiber in the state were compelling reasons to accept the sale.[21] Verizon and FairPoint agreed to additional conditions of the sale, which helped FairPoint service its debt and meet the performance enhancement plan conditioned by the Board.

FairPoint's debt, however, proved too great to service. The company filed for Chapter 11 bankruptcy protection in October 2009. During this same period of time, FairPoint's service quality had degraded to the point that the Department of Public Service filed with the Public Service Board a petition to show cause why FairPoint's certificate of public good should not be revoked.[22] The cutover from the Verizon system to the FairPoint system proved challenging for FairPoint. FairPoint experienced provisioning and service quality issues which further hurt FairPoint. Bankruptcy protection allowed FairPoint to shed $1.7 billion in debt obligations. In exchange, FairPoint's creditors received an equity interest in the company. Verizon's FairPoint stock was liquidated and many of FairPoint's debt payments were deferred until after 2011.

The Public Service Board approved the reorganization and restructuring plan put forward by the Department of Public Service and FairPoint in October of 2010. FairPoint was able to show the Department and the Public Service Board that its restructuring plan was reasonable given its revenue predictions. The Board approved the plan, which included several service quality conditions that FairPoint was obligated to meet.

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20. Joint Petition of Verizon New England Inc., Docket 7270, Order of 2/15/2008 at 39.
21. *Id.* at 4-5.
22. See *Petition of Department of Public Service for an investigation and for an order Directing Telephone Operating Company of Vermont LLC, d/b/a FairPoint Communications to Show Cause Why its Certificate of Public Good Should not Be Revoked*, Docket 7540, 7/14/2009.

Incentive Regulation

Competition in the telecommunications market benefits consumers. One way the state can promote competition is through even and fair regulation of the market. With the entrance of CLECs to the market, incumbent telephone companies have experienced dramatic line losses in the residential and business sectors. CLECs are able to offer lower prices and are subject to less regulation. Most ILECs, by contrast, are subject to rate-of-return regulation, making them slow to respond to changes in the marketplace.[23]

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The Department of Public Service, with the approval of the Public Service Board, helped ease regulatory constraints on Vermont's largest incumbent carrier, FairPoint, by negotiating an Incentive Regulation Plan (IRP) with FairPoint.[24] Under the IRP, which must be renewed every five years, basic local exchange service (BLES) rates are capped, and the company is given the opportunity to modify rates up to a set ceiling at any time, subject to the conditions of the IRP.[25] FairPoint is also relieved of its retail tariffing obligation for all services other than BLES, and may offer new services and rates at any time without notice to the Board. FairPoint may not offer retail prices more advantageous than those offered to its wholesale customers. FairPoint may also not offer promotional prices for periods of more than one year.

BLES rates and terms of service remain regulated, but the IRP gives FairPoint the ability to change rates at any time so long as the change is within the price cap. The current IRP prohibits FairPoint from deaveraging BLES service. This ensures rates in rural areas do not exceed rates in urban areas. The same Order approving the IRP also imposed on FairPoint the same service quality standards applied to the independent phone companies. The Plan sets metrics for wholesale and retail services that FairPoint must meet during the course of the IRP.

The Board observed that the IRP "will decrease the scope of regulation for FairPoint, providing the Company with increased ability to compete in the telecommunications marketplace."[26] The Board made several findings supporting the IRP. First, it concluded that FairPoint was experiencing competition from several facilities based providers, such as cable and fiber based companies, and mobile providers. Competitor cable plants passed 71.8% of addresses in FairPoint's service territory. Mobile wireless service covered 73% of FairPoint's footprint.[27] Between 2007 and 2011, FairPoint lost an estimated 33% of its lines. Telephone penetration was stable during this period.[28]

23. Vermont's independent ILECs, although considered rate of return utilities, are free of traditional cost of service regulation. See 30 V.S.A. § 227d.
24. The first IRP was with Verizon.
25. *Petition of Telephone Operating Company of Vermont LLC, d/b/a FairPoint Communications ("FairPoint"), for Approval of a Successor incentive Regulation Plan ("IRP")*, Pursuant to 30 V.S.A. § 226b, Docket No. 7724, Order of 1/18/2012at 8.
26. *Id.* at 1.
27. *Id.* at 6.
28. Telephone penetration is the measure of the population that has access to a telephone. Vermont's penetration generally remains stable and near 100%. The fact that FairPoint lost lines when penetration was stable suggests consumers were leaving FairPoint for other service providers

The Public Service Board found that FairPoint's low-use measured service rate was lower than any competitor offering. Additionally, FairPoint was the only provider for a significant portion of its rural service territory.[29] For these reasons, the Board required FairPoint to file tariffs for basic service and prohibited the company from deaveraging BLES rates.

Incentive regulation has been generally successful. The conditions imposed by the Public Service Board ensure that FairPoint can remain cost competitive with CLECs while investing in its facilities and improving reliability. Other states have deregulated the intrastate telephone market, leaving consumers exposed to the vagaries of market forces. Vermont's form of alternative regulation, by contrast, ensures basic consumer protections and reliability.

FairPoint competes with cable companies for voice and Internet access. FairPoint offers a basic service package priced on par with that of its competitors and is cost competitive in urban areas. FairPoint has also been a vital partner in the state's broadband expansion efforts. By leveling the competitive playing field, FairPoint has been able to compete where it matters and maintain stable prices in places where competition is lacking.

Federal and State Universal Service Fund Changes

One of the most significant industry changes since the publication of the *2004 Telecommunications Plan* was in the area of universal service. The Universal Service Fund supports four disparate programs: Lifeline (support for low-income consumers), Schools and Libraries (E-Rate), Rural Healthcare, and Connect America Fund (CAF) (formally the High Cost Fund). The CAF is relatively new, and replaces a system of "high cost support" to rural telephone carriers in areas where the cost of service is higher than likely revenue. On November 18, 2011, the FCC released an order redirecting high cost support to broadband development. This order, the so called *Transformation Order*, created the Connect America Fund and ties support to broadband infrastructure development and service. In the past, support was offered based on the projected cost to provide voice service. Under the new regime, support will be offered to provide broadband to specific locations.

The *Transformation Order* modifies Universal Service on an incremental basis and will take effect in phases. As an initial matter, the *Transformation Order* "froze" existing high cost support to price cap carriers. The Order limited some high cost support in favor of supporting building and operating broadband capable networks.[30] Over time, requirements for high cost support will become more stringent with the expectation that fewer providers will receive support.

In CAF Phase I of the *Transformation Order*, the FCC offered a onetime opportunity of $300 million to carriers in "incremental support" for capital

29. *Id.* at 7.

30. This restriction does not necessarily require recipients to expand broadband networks, although recipients may use support for that purpose. Peter Bluhm & Robert Loube, Revenue Effects of FCC Reforms to Intercarrier Compensation and Federal Universal Service Mechanisms 13 (2013).

construction of broadband facilities. FairPoint took its portion of this support and initiated projects that made service available to thousands of additional locations in Vermont.

CAF Phase II redirects $1.8 billion nationwide from explicit support for voice in high cost areas to instead support additional broadband availability. The FCC will commit to five years of support to incumbent carriers in exchange for the carrier's commitment to bring broadband service to areas that presently lack it.[31] The level of support offered to each carrier is determined by a cost model developed by the FCC. Price cap carriers will have the right to accept or reject the FCC's offer. The FCC will open any rejected offers to other carriers through a competitive bidding process. Rate of return carriers (including all Vermont ILECs other than FairPoint) will continue to receive high-cost voice support in exchange for a promise to provide broadband to any customer upon "reasonable request."

Vermont Universal Service Fund Changes

The state recently modified its universal service fund (VUSF) to support the expansion and improvement of broadband. The fund allows any Vermont eligible telecommunications carrier (VETC) to seek support in exchange for an obligation to provide basic voice and broadband service in a designated area.[32] Act 190 also established the Connectivity Initiative—a new program that supports improving broadband deployment in underserved areas.[33]

The VUSF was originally established to fund Telecommunications Relay Service (phone service for the hearing impaired), Vermont's Lifeline program, and enhanced-911 (E-911). This year, the General Assembly activated a high cost mechanism that supports ILECs serving rural locations. Under the new high cost support mechanism, any company can receive support by becoming a VETC. A VETC must offer "supported services" to all locations throughout the service areas for which it has been designated and must meet service quality standards set by the Board for voice telephone. Supported services include voice telephony service and broadband at 4 Mbps downstream and 1 Mbps upstream. The VETC can be relieved of the broadband obligations if it can demonstrate that the costs of meeting them exceed the support provided.

The Future of Universal Service

The causes of the ILECs financial troubles are many, but the major issue plaguing Vermont's carriers is the unsustainably high cost of serving rural locations. Under federal and state law, telecommunications providers, such as FairPoint, are treated as common carriers and are prohibited from price discrimination between customers of the same class.[34] Furthermore, COLR companies are obligated to serve every customer in their service territory

31. *Id.* at 14.
32. The VETC need not provide service where service already exists from another provider.
33. Discussed Infra at Chapter 4.
34. 47 U.S.C. § 202 (a).

who wants service.[35] Federal regulations indicate that a carrier designated by a state commission as an Eligible Telecommunications Carrier (ETC) is eligible to receive support, and shall offer the supported services throughout its service territory.[36] Federal regulations indicate that prior to permitting a carrier to be relieved of these obligations a state commission shall require other carriers to ensure that all customers will continue to be served.[37]

Much like rural electrification, there was an implicit cross subsidy embedded within this regulatory framework. The phone company achieved price parity by setting a price at a point above the cost of service in urban areas and below the cost of service in rural areas. The company's costs, however, are not evenly distributed and are largely fixed.[38] COLR companies traditionally received high cost support on a per line basis from the federal Universal Service Fund to offset losses incurred in rural areas. With the loss of urban lines, this model of cross subsidy no longer works.

Federal policy favors competition in the telephone market, but the playing field is not level.

Federal policy favors competition in the telephone market, but the playing field is not level. The *Telecommunications Act of 1996* gives new competitors some advantages over incumbents. New competitors do not have COLR obligations. Competitive exchange companies are able to offer service in profitable urban and suburban areas at rates below those of incumbent companies. Incumbents must allow CLECs access to their facilities at reasonable rates so that CLECs can effectively compete with them. Incumbent carriers have sustained significant line losses in the most profitable areas as a result of competition. The rural, high cost areas, however, remain untouched by CLECs, which have no economic interest in serving these unprofitable areas.

A series of independent reports, produced on behalf of the Department of Public Service, concluded that "Vermont is a daunting place to provide carrier of last resort service."[39] The report noted that for regulated operations in 2011, "all Vermont [incumbent] companies reported an aggregate net operating loss of $39 million."[40] The report predicted that Vermont's ILECs would continue to suffer losses in the future. While some losses may be due to inefficiency, the bulk of these losses are attributable to retail line losses, which is the primary source of revenue for telephone companies.

The independent reports' authors collected a variety of data on the finances of Vermont's incumbent carriers. The data showed that cost and density are negatively correlated in that costs increase as density decreases.

35. FairPoint must make service available to every address as a condition of receiving federal universal service support.
36. 47 C.F.R. § 54.201(d).
37. 47 C.F.R. § 54.205(b).
38. Carriers of last resort are responsible for maintaining their entire network, including every loop, regardless of whether they have the revenue base to support the maintenance of the network.
39. Peter Bluhm & Robert Loube, *Costs and Profitability of Vermont's Incumbent Telecommunications Carriers* (2014).
40. *Id.* at 41.

Profitability decreases as density decreases. The reports found that all Vermont ILECs have per-line costs higher than the national average.

Further compounding the problem is the transition in federal universal service support from high cost support for basic telephone service to broadband expansion. The 2011 *Transformation Order* shifted the focus of universal service from supporting the existing landline copper network to the Connect America Fund, a support mechanism for expanding broadband in unserved areas. COLR companies that relied on high cost support to offset losses in rural areas must now tie support to broadband improvement, leaving costs associated with the operation and maintenance of the telephone network to the supported company.

Collapse of Vermont's telephone networks is an unacceptable outcome. No other network exists at this time that can provide voice service to every part of the state. In most cases, commercial mobile radio service (CMRS) exists in rural areas, but there are two reasons why CMRS is not a suitable substitute for the wireline system at this time. First, wireless networks are very much dependent on the copper networks managed by the telephone companies to transmit and complete calls. CMRS providers contract with wireline companies for transport and other services necessary to interconnect with the public switched telephone network (PSTN). Second, cellular service providers are lightly regulated. States are preempted from rate regulation, and the FCC has exercised its "forbearance" power with regard to CMRS.[41] It is unreasonable to expect competition to bring reliable and affordable phone service to the remote reaches of the state, as other facilities based operators have little financial incentive to expand into low-density areas.

There is no easy solution to the problem. State policy supports universal access to affordable, and quality, basic telephone service. However, market volatility, changes in technology, and shifts in national telecommunications policy are forces beyond the state's control. Nevertheless, the state can attempt to make up for the loss in high cost support by instituting and fully funding a high cost support component of the state's universal service fund that funds both the improvement of broadband Internet service and the operation of basic telephone service.

E-911

Enhanced 9-1-1 is a term of art that refers to the type of system that Vermont initially put in place in the late 1990s. At that time, Enhanced 9-1-1 generally meant a system that was capable of furnishing the telephone number and location (that was always tied to a landline phone) of the caller to the 9-1-1 call taker when someone called with an emergency.

The system has evolved over the years. The push across the country is for 9-1-1 jurisdictions to adopt Internet Protocol (IP) based 9-1-1 systems, and those systems are referred to as "Next Generation 9-1-1."

41. *See Infra*. CMRS section of this Chapter.

In 2013, E-911 initiated a texting service, which allows people the opportunity to use short message service (SMS) to text E-911.

Vermont has had a Next Generation system in place since 2011, and the state is currently in a bid process to determine who the service provider will be after June 30, 2015. Having such a system in place enabled Vermont to be the first state in the country to provide Text to 9-1-1 services statewide to those citizens and visitors who are customers of the four nationwide wireless carriers. Vermont has played a leadership role in the development and implementation of Text to 9-1-1 and is recognized nationally as a leader in this initiative. Text to 9-1-1 is important to individuals who are deaf or hard of hearing, or those who may be in a dangerous situation where if they made a voice call to 9-1-1 that danger could increase. Since April, 2012 Vermont has had a number of critical interventions that resulted from someone sending a Text to 9-1-1. It has helped victims of domestic abuse and others who were not able to make a voice call get emergency assistance. It has proven useful in a situation where someone was lost hiking, and didn't have a strong enough signal to place a voice call, but the text sent to 9-1-1 was transmitted and the call taker was able to effect a rescue.

None of that would have been possible with the availability of the Next Generation 9-1-1 system. In the future, E-911 anticipates being able to receive and retransmit pictures and video, to better enable emergency responders to do their jobs.

An important focus of E-911 will be maintaining efficiency, accuracy and accountability within its system. Act 190 has started the process. Act 190 requires the Secretary of Administration to recommend to the General Assembly a plan for moving E-911 to the Division of Connectivity, the Department of Public Service, or the Department of Public Safety with a goal toward achieving annual operational savings of at least $300,000.00, as well as "enhanced coordination and efficiency, and reductions in operational redundancies."[42]

Transition to VoIP

When the federal *Telecommunications Act* was amended in 1996, the PSTN and the Internet were nearly completely separate. Voice service was the only plausible definition of an "essential" telecommunications service. This remained largely true at the publication of the *2004 Telecommunications Plan* when competition in the telephone market was still establishing itself. But technological changes over the last 10 years have blurred the line between what is and is not phone service. One significant change is the use of packet switching to carry voice data in the same way that information data is transmitted.

The PSTN relies on a switching system called time division multiplexing (TDM), whereby multiple analog telephone calls are digitized and sent on a common path, with each signal sequenced in fractions of a second. The signals have dedicated space in the signal path, and each bit of data takes the same path to termination. By contrast, the dominant packet switching technology, Internet Protocol (IP), converts the analog signal into packets of

42. 2014 Acts and Resolves No. 190, Sec 24.

information. With IP, each packet is assigned location data (an IP address) and sequencing data (to reorganize the data at the terminus). The packets are then sent over various pathways, including potentially over the Public Internet, and converge at their destination.

Voice over Internet protocol (VoIP) has allowed a greater number of competitors to enter the market for voice service, such as cable and Internet content companies. More importantly VoIP has challenged the distinction between "telecommunications service" (previously referred to as a "basic service") and an "information service" (or "enhanced service").[43] Some companies provide voice services to fixed locations over internally managed IP networks (fixed VoIP), which provide a high level of service quality. Other providers use IP technology to send voice traffic over the public Internet ("nomadic" or "over the top" VoIP).[44] Because federal law distinguishes between telecommunication and information services, and regulates each one differently, the rise of VoIP service raises an important question about what is a telecommunications service and what level of regulation states may exert over VoIP. The distinction between circuit switched technology and IP networks is one of technology. Consumers may not discern a difference between two similar services offered over different platforms.

The FCC has yet to decide whether VoIP is a telecommunications service or information service, but has imposed some requirements. VoIP providers must support local number portability, contribute to universal service, and provide E-911 service.[45] The FCC, however, has preempted state jurisdiction over VoIP services in instances where intrastate traffic cannot be determined.[46] Providers operating such nomadic VoIP services, such as Microsoft's Skype or Vonage, claim that they have no way to determine which calls are made intrastate versus those calls made interstate. The status of fixed VoIP services is less clear.

In 2007, the Department of Public Service initiated an investigation into whether the Public Service Board has jurisdiction over VoIP services provided in Vermont.[47] Comcast, for instance, currently offers a fixed VoIP service that is interconnected with the PSTN. Customers may place and receive calls with any other telephone user, regardless of whether the end user is a Comcast customer. Comcast's service is "fixed" in that it can only be used from one location, usually the customer's home or business. Calls are sent through Comcast's managed network and do not touch the public Internet.

43. States have regulatory authority over intrastate telecommunications and information services, but are preempted from regulating interstate telecommunications and information services. Broadband Internet access has been defined as an interstate information service. Services employing VoIP have not been defined.

44. This discussion is confined to "fixed" and "nomadic" VoIP services capable of interconnecting with the PSTN.

45. 47 C.F.R. § 52.34.

46. *Minn. Pub. Utils. Comm'n v. FCC*, 483 F.3d 570, 574 (8th Cir. 2007).

47. *See* Docket No. 7316.

Mobile Wireless Standards

Most wireless users have heard or seen the terms "3G," "4G," and "LTE," but what do they mean? Mobile wireless telecommunications technology is guided by standards set by the International Telecommunication Union (ITU). The overarching performance requirements set forth in the ITU standards are fleshed out in detailed engineering specifications produced by other standards setting bodies. First generation (1G) mobile wireless service refers to analog cellular systems launched in 1981. In these systems each telephone call operated in a separate set of frequencies. In second generation (2G) digital cellular service, audio signals in telephone calls were digitized and transmitted over emulated circuit switched channels. An important 2G technological specification for voice service was GSM, the Global System for Mobile Communications, a standard issued by the standards body ETSI in 1992.

While 2G services do contemplate mobile wireless data, 3G standards put more focus on data speeds. In 1999 the ITU released the 3G cellular standard referred to as IMT-2000 which specified 200 kbps peak data rates. The standard also called for improvement over time, "It is expected that IMT-2000 will provide higher transmission rates: a minimum speed of 2Mbit/s for stationary or walking users, and 384 kbit/s in a moving vehicle." A standards setting body called the 3GPP (or 3rd generation partnership project) built on the GSM specifications to develop the 3G standard formally called UMTS (Universal Mobile Telecommunications System). The industry continued to improve technology, and UMTS evolved to include HSPA (High-speed packet access), which is sometimes referred to as 3.5G.

The 2008 ITU specification for 4G is referred to as International Mobile Telecommunications Advanced (IMT-Advanced). This specification calls for support of 100 Mbps for high mobility communication and 1 Gbps for pedestrians and stationary users. Unlike earlier generations, 4G does not support circuit switched telephony but instead supports only VoIP. Long Term Evolution (LTE) refers to the dominant technological specifications developed by the 3GPP. When LTE became available, some referred to it as 4G, while purists call it 3.9G. The ITU recognized that while LTE does not meet the IMT-Advanced requirements, it could nevertheless be marketed as 4G. The 3GPP recently released specifications for LTE-Advanced, which do meet the 4G requirements specified by the ITU in the IMT-Advanced standard.

As this Plan goes to press, discussions among industry leaders and policy makers are already underway to define standards for 5G.

The Public Service Board ruled that, as a matter of state law, Comcast's service was a telecommunications service. However, the Public Service Board did not reach the question of whether VoIP was a telecommunications service as a matter of federal law.[48] On appeal, Comcast argued that the Public Service Board erred by not determining whether VoIP service should be classified as an interstate information service under federal law. As an interstate information service, Vermont would not be able to impose common carrier regulation on VoIP providers. The state Supreme Court ruled that the Public Service Board must answer this question and remanded the case for further proceedings.[49] It is the Department's position that VoIP service provided over managed networks to fixed locations is a title II telecommunications service under the *Telecommunications Act*.

48. *In Re Investigation into Regulation of Voice Over Internet Protocol Service*s, 193 Vt. 439, 449-50 (2013).
49. A decision was pending at publication of this *Plan*.

The FCC appears to be supportive of the transition from TDM to VoIP. This past year, the FCC approved AT&T's plan to conduct a series of experiments in which it will convert certain exchanges from TDM to IP. AT&T selected two study areas. The first wire-center is in Carbon Hill, Alabama, a sparsely populated rural area. The second wire center is in King's Point, Florida, a suburban area with multiple retirement communities. AT&T will offer new business and residential customers in these areas IP-based services in place of traditional TDM services. Existing customers can keep the service they have. AT&T also proposes to drop wireline service altogether in some areas of these communities and to serve these areas through its wireless subsidiary, AT&T Mobility. AT&T will not remove copper infrastructure.

The transition to VoIP raises several issues. One issue is that fiber based IP systems rely to a greater extent on electrical service to power the system. Both end user and provider battery sources may not have sufficient life to keep service running for more than a few hours during a power outage.

A transition from the circuit switched technology to IP is inevitable, and the roles that states and the national government play in this transition will be crucial to determining basic questions about quality, reach, and affordability of basic voice service in the future. If the AT&T experiments are successful, the states should expect all phone companies to begin the transition. State policy makers should support national proposals that ensure VoIP networks provide for the same level of reliability and consumer protection that consumers currently enjoy with their copper based landline services.

Wireline Abandonment

Another national trend closely related to the transition to VoIP is the potential abandonment of wireline facilities by service providers. In the aftermath of Hurricane Sandy, Verizon briefly proposed abandoning its wireline service in parts of Fire Island, NY in favor of Voice Link, its fixed wireless service.[50] Many residents of Fire Island opposed the transition, citing concerns over reliability and the extent of service. Consumers feared losing DSL service, the ability to use burglary systems, losing the system in an electrical outage, and the reliability of E-911. In response to this opposition, Verizon dropped its plans to abandon wireline service and instead transitioned Fire Island to its Fiber based FiOS service.

AT&T has also sought to abandon wireline service in areas where the cost of providing wireline service exceeds the cost of its wireless service. As discussed in the VoIP passage of this section, AT&T has petitioned the FCC to allow it to provide wireless service as a substitute for wireline service in its VoIP-only study area. While the FCC has approved AT&T's plan to offer wireless voice as a substitute to landline service in its VoIP wire

50. *Comments Invited on Application of Verizon New Jersey Inc. and Verizon New York Inc. to Discontinue Domestic Telecommunications Services*, Public Notice, WC Docket No. 13-149 Comp. Pol. File No. 1112, 28 FCC Rcd. 9193 (Wireline Comp. Bur. 2013).

center trials, the FCC has not condoned or otherwise expressed support for landline abandonment.

No Vermont provider has suggested abandoning wireline service, and there is no evidence Vermont's providers will attempt to abandon service in the near future. However, as the wireline market becomes more costly to manage, Vermont should prepare for the possibility that service providers will look to wireless as an alternative to the traditional copper network, so that appropriate consumer protections and reliability standards can be maintained.

Commercial Mobile Radio Service (CMRS)

Mobile wireless voice service is becoming ever more vital to Vermont's residents and businesses. Vermonters' use and reliance on mobile voice technology has increased since the publication of the last telecommunications plan. Twenty nine percent of Vermont households are wireless-only households. Wireless Internet access has become a technologically feasible alternative to landline data services and, in some areas, the only source for broadband internet access. Since 2007, it has been Vermont's goal to obtain ubiquitous mobile voice coverage along state highways and interstate roads.

Infrastructure Development

Wireless telecommunications infrastructure is central to the provision of service. Providers need facilities throughout the state in order to meet their coverage goals. In 2008, the General Assembly passed a law streamlining the permitting process for new telecommunications facilities.[51] The law, known as "248a," gives the Public Service Board authority to permit new facilities and modifications to existing facilities outside the Act 250 permitting process. The law allows providers to seek a certificate of public good from the Public Service Board for construction of telecommunications facilities, such as cell towers in any town or city in Vermont. The law also allows applicants to co-locate equipment on existing structures, such as farm buildings, church steeples, ski resorts, or existing telecommunications towers.

Section 248a has been very successful. From January 2012 to January 2014 the Public Service Board approved 216 applications under 248a. Many of these applications were for upgrades and modifications to existing facilities. About 50 of these were for new facilities. Vermont's two largest nationwide providers, AT&T Mobility and Verizon Wireless, have taken full advantage of the 248a permitting process. AT&T filed ninety-five applications in that two year period. Verizon filed 28 applications in that same time.

VTel Wireless has also taken advantage of the law during the roll out of its Wireless Open World (WOW) project.[52] Between January 2012 and January 2014, VTel filed 75 applications, all of which have been in support of its WOW project. The WOW project will be available throughout Vermont, including some presently underserved communities.

51. 30 V.S.A. § 248a.

52. VTel WOW is discussed *Infra* in the VTel section of this Chapter.

In 2014, the General Assembly made procedural reforms aimed at increasing municipal participation in the 248a process. The updated law gives towns the ability to intervene in 248a petitions as a matter of right. It also affords towns the opportunity to have a public hearing with applicants and the Department of Public Service regarding new and heavily modified facilities. 248a will be in effect until July 1, 2017. Wireless providers will likely continue to expand their networks at a rate similar to the last two years. With the greater community input that the new 248a revisions provide, Vermont's CMRS providers will be able to target service improvements where they are most needed and in ways that conform to local planning goals.

CMRS Regulatory Framework

The FCC has general authority over CMRS providers. States retain regulatory control over "other terms and services." The FCC has exercised its "forbearance" authority over CMRS and generally does not require companies to file tariffs. CMRS providers must adhere to general principles of common carrier regulation, such as the rule that rates must be "just and reasonable" and laws prohibiting customer discrimination. CMRS providers are also subject to E-911 and Universal Service Fund contributions.

Vermont regulates CMRS providers to the extent permissible by federal law. CMRS providers must obtain a license to provide telecommunications services in Vermont. As conditions of licensure, the Public Service Board requires CMRS providers to file their standard service contract with the Public Service Board and post bond in advance of offering prepaid voice services. Providers must also contribute to the Vermont Universal Service Fund.

The regulatory structure for CMRS providers differs greatly from traditional telephone service. This is mostly because the retail market for wireless service differs from that of the residential landline telephone market. Policy makers and regulators generally consider the wireless market to be competitive. Vermont is served by four nationwide providers. These are AT&T Mobility, Verizon Wireless, T-Mobile, and Sprint PCS. Nationwide providers operate networks that touch all fifty states. In addition, there are numerous regional and local wireless providers in Vermont, notably including US Cellular. Currently, VTel Wireless is the only local provider offering mobile wireless service in the state.[53]

The wireless market is not as competitive as the current regulatory framework would imply. The industry has experienced a considerable amount of consolidation in the last ten years. The four nationwide providers listed above possessed 92% of the total share of the U.S. market as of July, 2012. The U.S. wireless mobile market had a Herfindahl-Hirschmann Index (HHI) weighted average score of 2,873 at the end of 2011, which is considered "highly concentrated" by the federal agencies

53. VTel will offer voice service through a VoIP application on mobile devices. Customers will utilize VTel's wireless 4G/LTE data network to place VoIP calls.

that use the HHI.[54] The concentration of the market is a direct result of mergers and acquisitions by and between these four large companies and smaller regional providers.

The consolidation of local and regional providers into four nationwide providers has limited consumer choice. However, it also enhanced the level of service. Consumers rarely pay roaming charges anymore. Consumers can also expect comparable service as they travel throughout the country. Prices for wireless voice service have declined over time, suggesting that the market has retained some characteristics of a competitive environment. For this reason, the FCC continues its policy of regulatory forbearance.

The FCC has not been totally silent on CMRS issues. In 2010, the FCC issued a report detailing customer confusion about early termination fees (ETFs) and other fees. ETFs are fees consumers must pay to exit their wireless service contracts. The report and survey noted widespread instances of "bill shock" when it came to fees incurred for data overages and ETFs. In response to the FCC's inquiry, the wireless industry undertook voluntary measures to better notify customers of early termination and data overage fees.

In Vermont, the Attorney General's office also investigated third-party providers for "cramming"—the practice of loading consumer bills with unauthorized fees. In 2013, Attorney General William Sorrell announced a settlement with the state's major cell service providers to stop cramming. AT&T Mobility, T-Mobile, and Sprint agreed to no longer charge their customers for commercial Premium Short Messaging Services (PSMS), also known as premium text messages. PSMS accounted for the majority of third-party charges on bills and for the overwhelming majority of cramming complaints received by the Attorney General.[55]

Vermonters in particular value voice service as evidenced by Vermont's above average telephone penetration rate.

The Future of Voice Service

Voice service plays an important role in the way Americans communicate and will continue to be an indispensable resource to Vermonters for the next 10 years. While other forms of communication, such as email and short messaging service, have supplemented voice, nothing has supplanted it. Vermonters in particular value voice service as evidenced by Vermont's above average telephone penetration rate. The main challenge ahead is the continued provision of voice service in rural areas. Reductions in support, coupled with the high cost of maintaining aging, rural infrastructure, make rural service a challenging enterprise.

54. The Herfindahl – Hirschmann Index (HHI) is a calculation used to measure the competitiveness of a given market. The HHI is calculated by summing the squares of the individual firms' market shares. The HHI ranges from less than 1 (atomistic market) to 10,000 (pure monopoly). The FTC and Justice Department consider any market with a score of 2500 or greater to be "highly concentrated." *See* FCC, Wireless Monitoring Report, (March 2013).

55. Press Releases: AT&T Mobility, Sprint and T-Mobile Will Stop Billing Problematic Third-Party Charges, Vermont Attorney General, November 21, 2013, http://www.atg.state.vt.us/news/att-mobility-sprint-and-t-mobile-will-stop-billing-problematic-third-party-charges.php

Cost is the main obstacle. Before publishing this Plan, the Department solicited comments from service providers about their future needs. All responding providers cited the cost of rural service as the main obstacle. Most of the cost of a telephone network is "sunk" in the initial investment of capital. That cost is then recouped over time with revenue generated from retail service. Line losses, aging infrastructure, and the reduction in high cost support all work against rural providers. Providers are no longer guaranteed the opportunity to recoup their costs through service delivery.

In other parts the country, providers have suggested scrapping wireline service in favor of a wireless network. Providers cite cost and the difficulty obtaining replacement parts for aging equipment. Vermont is not well suited to this kind of network. Wireless facilities have not yet reached every rural customer. More importantly, wireless service, while competitive with most wireline service packages, may not be cost competitive with landline providers' low use measured service. It is unclear whether the state could exert rate regulation over "fixed" wireless services when the wireless company is the primary provider. Wireless is, however, a suitable supplement to wireline service, and should be made available everywhere in the state.

Vermont needs its wireline networks at this time. For rural residents and small businesses, wireline service is a necessity. Residents in rural areas may not have adequate cell coverage. DSL is also the best available broadband option in Vermont's most rural areas. Concerns over E-911 and the reliability of wireless service in a power outage are valid and should be carefully considered before the state accepts wireless services as a substitute for wireline services.

Internet Access

The importance of high speed Internet access to Vermonters cannot be overstated. Internet access is a prerequisite to participation in our nation's information economy. Vermonters use Internet access services to participate in commerce, politics, education, and business. In addition, Vermonters rely on it to access social media platforms, entertainment, cloud based services, and the wealth of information available online. Internet access is an indispensable resource for job seekers, who must rely on it to find and apply for employment opportunities. Vermont businesses need Internet access to market goods and services, interact with customers, and process transactions. While this Plan does not opine on any issue related to Internet content or use, this Plan reiterates the same sentiments observed in the Executive Summary of the *National Broadband Plan*, "Broadband is the great infrastructure challenge of the early 21st Century."[56] To remain competitive in our national economy, Vermont will need to remain focused on building a robust digital network that serves all Vermonters.

56. FCC, *National Broadband Plan* at xi (2010).

Since 2007, it has been the goal of Vermont to bring high speed Internet access to all parts of the state. The *2011 Telecommunications Plan* put forward a policy of aggressively supporting the expansion of broadband Internet access to unserved areas. In 2010, Governor Peter Shumlin made it the goal of the state to have a funded broadband solution in place for every Vermonter by the end of 2013.

Thanks to the investments and hard work of Vermont service providers, the Administration, and Vermont's policy leaders, high speed Internet access is now universally available. Only 1% of addresses lacked service at the end of 2013, and all of these addresses have a funded solution in place. This section discusses the broadband expansion efforts of the last decade and the ways in which Vermont's broadband network is improving. This section also describes the kinds of infrastructure investments that will be necessary to ensure Vermonters have a robust and reliable network.

The state's other broadband goals included having the availability of mass-market broadband and mobile service along roadways; achieving universal first responder communications; connecting "anchor institutions" with fiber broadband service; having universal adoption of broadband at home and at work; and deployment of smart meters for electric service. Today, these goals remain the policy of the Department of Public Service. There is still room to expand and improve upon the services currently being offered. Demand for bandwidth will increase as consumers find new uses for the service. Similarly, wireless service has greatly expanded throughout the state, but there is a constant need to improve speed. This is especially true as consumers begin to rely more heavily on their smart phones and fixed wireless service for data consumption.

Vermont employed several strategies to meet its service and adoption goals. Strategies included directing investment to projects in unserved and high cost areas, streamlining the permit process for telecommunications facilities, partnering with private enterprise to deploy broadband, and mapping investment and coverage needs. Vermont will continue these efforts as the state plans for the future.

The new focus of the public-private partnership will be speed. Vermonter's needs for bandwidth will steadily increase as consumers find new Internet based applications. Consumers are increasingly using mobile devices, and the deployment of wireless infrastructure will become integral to the success of Vermont's high-tech economy. This section describes the important activities and initiatives of the past decade and what will be important to Vermonters as the state plans for the following ten years.

Overview of Vermont's Internet Access Market and Infrastructure

There are several ways in which high speed Internet access is provided to Vermonters. Vermont residents and businesses may purchase Internet access service from cable television providers in locations where cable is accessible. Landline telephone companies sell Digital Subscriber Line (DSL) service, which provides access via copper telephone wires. Some providers, such as Burlington Telecom, Topsham Communications, and

VTel, offer fiber to the home service within their territories. These fiber to the home systems feature some the highest speed residential service in the State. CMRS providers offer mobile data plans through 3G and 4G/ LTE networks. Vermont is also home to several wireless Internet Service Providers (WISPs), which sell fixed wireless service to homes and businesses. VTel, for instance, began offering wireless Internet service in several rural Vermont towns this summer.[57] Customers may also purchase Internet services through satellite providers.

Cable providers have networks that could serve an estimated 67.5% of the state's E-911 residential and business locations. DSL networks reach about 89.6% of the addresses. Together, DSL and cable reach 95.5% of locations. Approximately 4.8% are served by other platforms, and 1% of locations have a funded solution in place. CMRS providers have 3G and 4G networks that cover over 96% of the state's locations, and this is improving every day. Through the projects described below, high speed broadband will soon be available in some of the hardest to reach locations of the state. Satellite is also becoming a viable alternative to terrestrial networks, as it can offer service anywhere and at speeds comparable to DSL and mobile wireless service.

In urban and suburban areas, such as Burlington and its surrounding communities, most consumers have competitive choice from multiple providers on multiple platforms. Residents in Burlington can obtain broadband access through cable, fiber to the home, DSL, and mobile wireless networks. Residents of rural areas generally have less competitive choice, but new options are coming online. Those in remote parts of the state are best served with fixed and mobile wireless services.

Minimum Technical Service Characteristic Objectives

Vermont law directs the Department to define the minimum technical service characteristic objectives (Objectives) that ought to be available as part of broadband services commonly sold to residential and small business users throughout the state.[58] The purpose of that provision was to direct investments by the Vermont Telecommunications Authority (VTA). Although the functions of the VTA are transitioning to the Connectivity Division, the Objectives remain important for two reasons.[59] First, locations lacking access to services that meet the Objectives are eligible for support from the Connectivity Initiative.[60] Second, the Connectivity Division is directed to promote the expansion of broadband services that offer actual speeds that meet or exceed the Objectives contained in the state's *Telecommunications Plan*.

57. Discussed later in this chapter.
58. 30 V.S.A. § 8077.
59. 2014 Acts and Resolves No. 190, Sec. 9 directs the Department to include the Objectives in the telecommunications plan starting in 2017.
60. 30 V.S.A. § 7515b. The Connectivity Initiative was created with the purpose of bringing broadband that is capable of 4 Mbps download and 1 Mbps upload to each service location in Vermont.

The Department defined the Objectives at 4 Mbps download and 1 Mbps upload (4/1) in the *2011 Telecommunications Plan*. In the *Transformation Order*, the FCC specified that all services supported by the Universal Service Fund must provide Internet access with speeds of 4/1 Mbps.[61] The Department mirrored the state's Objectives on those set by the FCC. The Objectives set in the 2011 Plan remain in effect today. More discussion on the Objectives can be found in Chapter 5 of this Plan.

Legal Framework for High Speed Internet Access Expansion and Improvement

The FCC has found it challenging to regulate the Internet and Internet access services. Much of the challenge is, however, self-imposed. In 2002, the FCC categorized broadband Internet access service as an "information service," exempting broadband providers from the basic common carriage rules of Title II of the *Telecommunications Act*.[62] While the FCC retains some "ancillary" authority over Internet access services, its classification as an information service prohibits the FCC from enforcing net neutrality rules, reviewing interconnection agreements between backbone providers, and regulating retail rates and terms and conditions which it would otherwise be able to do pursuant to its powers in Section 706 of the *1996 Telecommunications Act*.[63] When it comes to encouraging the construction of broadband infrastructure through universal service support, the FCC has relied on its ancillary authority and a controversial interpretation of the *Telecommunications Act*'s provisions governing Universal Service Fund support eligibility.[64]

Some argue that Title II reclassification would provide a sounder legal basis for establishing direct support for rural broadband under the Universal Service Fund, while industry leaders believe that competition and the FCC's ancillary jurisdiction are sufficient to meet national universal service goals.[65] Until now, the FCC has not seriously considered reclassifying

61. The FCC indicated that some percentage (to be defined later) would need to support 6 Mbps download speed and 1.5 Mbps upload speed. The FCC has yet to define the percentage that would need to meet these speeds. However, in FNPRM 14-54, issued June 10, 2014, the FCC sought comment on a proposal to increase the benchmark prospectively to a download speed of 10 Mbps and some upload speed greater than 1 Mbps. (http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0626/FCC-14-54A1.pdf) ¶ 138.

62. 47 U.S.C. §§151-61. Prior to 2002, the FCC had designated DSL transmissions as a telecommunications service. Internet access services were exempt, but the pure transmission of data over telephone lines was not. See *See In re Deployment of Wireline Services Offering Advanced Telecommunications Capability*, 13 F.C.C.R. 24012, 24014, 24029–30 ¶¶ 3, 35–36 (1998) ("*Advanced Services Order*").

63. *Verizon v. FCC*, No. 11-1355, slip op. (D.C. Cir. Jan. 14, 2014) (Holding that the FCC was empowered by § 706 of the Telecommunications Act to regulate broadband Internet service, but that its most recent attempt to implement net neutrality rules amounted to common carrier regulation, which the agency was precluded from promulgating without first classifying broadband as a telecommunications service).

64. 47 U.S.C. § 254(e) restricts universal service support to "eligible telecommunications carriers." Because broadband is classified as an information service, many argue that the FCC is exceeding its statutory authority by tying support to broadband availability. Jonathan Nuechterlein & Paul J. Weiser, *Digital Crossroads*, 313 (2d ed. 2013).

65. FCC, *Connecting America: The National Broadband Plan* 337 (2010).

broadband as a title II service, but the FCC will continue implementing the *National Broadband Plan* it formulated in 2010.[66]

The universal service reforms of the *Transformation Order* provide national support to telephone carriers willing to provide broadband and act as COLR in rural territories.[67] As discussed in the Voice section of this chapter, support is frozen at 2011 levels, and recipients will need to meet availability goals and technical benchmarks as a prerequisite to receiving support. Federal benchmarks restrict funding to services that support speeds of at least 4 Mbps download and 1 Mbps upload.[68] The CAF fund makes available annual support of $1.8 billion dollars to price cap carriers, $2 billion to rate of return carriers, $500 million to the CAF Mobility Fund, and $200 million to remote and tribal lands. The FCC will rely on market driven policies and competitive bidding to direct investment in broadband capable networks.

Price cap carriers (including in Vermont only FairPoint) will be offered the opportunity to receive funds in return for deploying broadband to areas completely lacking 4/1 Mbps service. Once the awards are made, either to FairPoint or to another company through an auction if FairPoint declines the offer, the current frozen voice support will be withdrawn. Two issues with the CAF support in price cap territories especially affect Vermont: issues related to locations and partially served census blocks. The FCC uses census bureau household data, which differs from and is less accurate than the E-911 data Vermont uses. The FCC considers a census block ineligible for CAF II support if a single location in the census block is served by an unsubsidized competitor. This means that partially serviced census blocks are ineligible for CAF II support. The Broadband chapter of this Plan discusses these issues further.

Rate of return carriers, (including all rural carriers in Vermont) are required to offer broadband service meeting 4/1 upon reasonable request.[69]

States have limited authority to regulate broadband Internet access service. Vermont has no legal authority to compel broadband providers to offer service in designated areas or offer minimum threshold speeds. Vermont's strategy to date has relied on incentive programs such as grants and universal service support that encourage providers to bring service to rural and remote areas. Unless and until national lawmakers shift national policy

66. The FCC has thrice attempted to implement net neutrality rules without reclassifying Broadband Internet. In its current proposal, the FCC is seeking comment on whether it should reclassify Broadband. However, the FCC cites 47 U.S.C. § 706 as the legal authority to implement the rules currently under consideration. See *In Re Protecting and Promoting the Open Internet*, GN Docket No. 13-28, ___ FCC Rccd. ___ (2014), ¶¶ 142-147 & 148 .

67. For purposes of Universal Service, the FCC has designated high cost areas by census block.

68. *See* FCC, *Sixth Broadband Progress Report* (2010)

69. In the FCC order 14-54, the FCC declared that a request would not be reasonable if the incremental cost of implementing necessary upgrades to a particular location exceeded the revenues that could be expected from that upgraded line, including federal or state universal service support projected to be available under current rules. Paragraph 65, (http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0626/FCC-14-54A1.pdf)

from an incentive based strategy to a regulatory one, Vermont will need to continue on its chosen course. This Plan discusses the various ways in which the state has encouraged investment in broadband capable networks and what the state should do to further its broadband goals.

State Efforts to Increase Broadband Availability

Data and Mapping Initiatives

Vermont state government, through its partnerships with telecommunications industry leaders, initiated an aggressive and comprehensive effort to map and chart broadband progress. The Vermont Agency of Commerce and Community Development coordinated with the Department of Public Service and the Vermont Center for Geographic Information to capture and map data about broadband availability. Address specific information about availability was collected from service providers. Broadband information on a census block basis was made publicly available on broadbandvt.org, the state's Internet access specific website. The initiative was funded by a $3.5 million federal grant. Through crowdsourcing, the state was able to verify coverage data and map areas where coverage is still needed. The state was able to provide some of the most granular data in the nation on high speed Internet and broadband availability. The mapping effort has also helped the state and industry partners target development where it is most needed. Information on Vermont's broadband initiatives can be found at www.broadbandvt.org.

Vermont Telecommunications Authority

Since 2007, The Vermont Telecommunications Authority (VTA) has worked toward Vermont's broadband and mobile wireless service goals. The VTA, a quasi-governmental organization, is governed by an appointed board and works toward goals laid out in 30 V.S.A. § 8060 (b) to expand broadband and cellular service. Currently, the VTA focuses on four broad areas: grants, developing and managing fiber optic infrastructure, developing wireless sites (towers and non-tower sites), and leasing wireless equipment.

The VTA has run grant programs to expand broadband service since its creation, and currently has nine last-mile grant-funded projects in process. This includes nine awards for last-mile broadband service expansion to FairPoint, Comcast, Topsham Communications, Southern Vermont Cable, and EC Fiber. The VTA has run a program to directly assist unserved consumers with the costs of extending cable for broadband to their locations.

The VTA has developed fiber optic infrastructure to support broadband service and provide backhaul for cell sites wireline transmission from the cell site to the carrier's network. Its largest project to date is the funding of the Vermont Fiber Connect project, an initiative of the federal Broadband Technology Opportunities Program (BTOP) stimulus, which funded "middle-mile fiber networks." The Vermont Fiber Connect project is developing approximately 800 miles of fiber in eight counties, and has two subawardees, Sovernet and New Hampshire Optical Systems. The

Vermont Fiber Connect project includes approximately $33.4 million in federal funding, $2.4 million in state capital funding, $400,000 in foundation funding, and $12 million in private funding. More recently, the VTA has worked to directly develop fiber optic networks for both last-mile and middle-mile purposes. It currently has three primary projects in process related to this dark fiber development.[70]

The 2014 legislative session marked a milestone for the VTA. With the state's expansion goals largely met, the General Assembly initiated policy reforms that shift the focus from infrastructure expansion to speed. The VTA, which was originally conceived as a temporary vehicle for infrastructure development, is shifting too. The General Assembly dissolved the VTA as an independent, non-profit entity, and redirected its resources to a new organization within state government called the Division of Connectivity.[71] The VTA will cease operations on July 1, 2015.

The Division of Connectivity will have a similar makeup and mission to that of the VTA, but will be focused on bringing access to Vermonters at threshold speeds of 4/1. The Division of Connectivity will promote broadband development and improvements by coordinating state government initiatives, providing grants, and planning, among other efforts.

The Connectivity Fund and High Cost Support

Act 190, enacted in 2014, created the Connectivity Fund. The Connectivity Fund is a program under the Vermont Universal Service Fund that will be used as a vehicle for supporting Broadband facilities upgrades and operations. The fund will be administered by the Department of Public Service. The Department will publish annually a list of census blocks eligible for funding based on the Department's most recent broadband mapping data. Using this data, the Department will then solicit proposals from service providers, and the VTA and Division of connectivity, to deploy broadband in eligible census blocks. Projects will be chosen based on cost, quality, speed and conformance with the *Telecommunications Plan*.

Act 190 also activated a high cost fund for Vermont Eligible Telecommunications Carriers (VETCs). The high cost fund provides support to VETCs for capital improvements in high cost areas to build broadband capable networks. VETCs must provide voice telephony and broadband to receive support. The law provides support to rural telephone companies, as defined by federal law, and rural exchanges served by the RBOC, FairPoint.

The Connectivity Fund is a program under the Vermont Universal Fund that will be used as a vehicle for supporting Broadband facilities upgrades and operations.

70. Dark fiber is the leasing of point to point fiber, as opposed to the sale of transmission service. Current dark fiber projects include the Hardwick-Newport Fiber Project, the Orange County Fiber Connector, and the Northern Borders Connectivity Project in Northern Orleans County, at a cost of approximately $2,031,000 in state funding, plus approximately $220,000 in Northern Borders Regional Commission funding.

71. 2014 Vermont Acts and Resolves No. 190, Sec 28.

ILEC High Speed Internet Access Expansion

All ILECs offer high speed Internet access. FairPoint, Vermont's largest incumbent carrier, offers DSL service to an estimated 92% of the service locations in its territory. VTel, as described above, offers fiber to the home to customers in its territory. The other independent phone companies offer DSL within their entire service territories. Most offer service at speeds of 4/1 or higher.

FairPoint is working diligently to expand its DSL capable network. FairPoint invested $6.6 million dollars in broadband expansion pursuant to agreements reached between it and the Department of Public Service over FairPoint's failure to meet service quality metrics.[72] These agreements helped FairPoint bring broadband to 3,000 new customers, 500 of which were previously unserved.

FairPoint also invested $120 million in fiber backbone upgrades by fulfilling its obligations under Docket 7270. Some of this investment was a dollar specific expenditure requirement on network upgrades and a portion was spent meeting its broadband build out obligations. This important network upgrade replaced outdated copper connectivity between central offices with fiber. It also extended fiber to remote terminals. In addition, FairPoint invested in electronics equipment upgrades, such as D-SLAM and metro Ethernet. These upgrades have allowed FairPoint to compete with other providers, such as cable providers, for business and residential customers.

VTel Wireless Open World

Vermont Telephone Company (VTel) began a project in 2011 to bring wireless broadband service to Vermont. This project is central to the state's broadband efforts. VTel is installing a statewide wireless network called wireless open world (WOW).[73] WOW's 4G/LTE network will reach Vermont's presently underserved and unserved areas. The WOW project was made possible through the support of the federal Rural Utility Service (RUS), the National Telecommunications and Information Administration (NTIA), and VTel. The NTIA awarded VTel $82 million through a grant and a $35 million loan to build the network. VTel contributed $30 million in spectrum licenses.

Once complete, the project will consist of 200 4G/LTE equipped wireless facilities that will reach an estimated 18,000 unserved or underserved addresses and 97% of the state. The WOW project will bring service to some of the most remote regions of the state. The project also includes fiber to the home in VTel's telephone service territory. The project has been hailed as a model for broadband expansion nationwide. On July 1, 2014, VTel began offering service, covering 20,000 rooftops in 24 towns. Some locations now served by VTel were previously unserved. Other locations were served, but now have choice between two or more providers.

72. Docket 7725.

73. VTel Grant Application Summary, 3/29/2010.

CLEC Broadband

Cable Internet Access

All cable providers in Vermont offer broadband service. Cable plants cover an estimated 67.5% of addresses within the state. All cable providers offer speeds of at least 4/1 Mbps and in most cases much faster speeds. Prices for broadband service are generally competitive with DSL, but cable offers higher speeds. Vermont is served by Comcast and Charter, two of the nation's largest cable companies and several small, independent cable companies.

Nationally, the cable market is consolidating. As this Plan goes to publication, the FCC and Department of Justice are reviewing a potential merger of Comcast with Time-Warner Cable. Both companies have a national presence, and this sale could potentially affect millions of customers nationwide, including Vermont's Charter and Comcast customers.

Burlington Telecom

Burlington Telecom is Vermont's only municipal telecommunications company, which is operated as a department of Burlington City government. Burlington Telecom has certificates of public good (CPGs) to provide telecommunications and video service throughout the entire city, and offers fiber to the home services in most Burlington neighborhoods. Conceived in the early 1990s, Burlington Telecom began offering video and advanced telecommunications services in 2007. Today Burlington Telecom can offer broadband speeds of up to 1 gigabit per second (Gbps) download and upload speeds.

Burlington Telecom brought consumers some of the fastest broadband in Vermont, but failed to achieve sustainable penetration levels. On September 13, 2005, the Board granted the City of Burlington a CPG to own and operate a cable television system within the City. On August 9, 2007, the City entered into a lease/purchase agreement with CitiCapital Municipal Finance (Citibank) to finance 33.5 million for the build out of the BT system. BT also used approximately $16.9 million the City's general fund for the build out of the BT system in contravention of the City's charter and CPG.

Citibank filed a lawsuit against BT in 2011 after BT failed to make regular payments under the lease/purchase agreement. Citibank sought damages for the $33 million, plus costs and punitive damages. After three years of litigation, in 2014 Citibank and Burlington Telecom came to a mediated resolution, which allows the city to extinguish the $33 million debt in exchange for paying $10.5 million. The agreement calls for paying the sale of BT to a private entity within five years. The agreement will shield Burlington taxpayers from further liability, and guide the City out of the telecommunications business.

Burlington's telecommunications market underwent significant change between 2006 and 2010. Adelphia Cable was Burlington's primary video service provider during the early part of the 2000s. Verizon provided phone service. Both companies had little interest in providing advanced

telecommunications services to Burlington residents. Since Burlington Telecom began offering service, FairPoint purchased Verizon's lines and Comcast purchased Adelphia. These companies made a positive commitment to serving Burlington and today offer broadband service throughout the city. Most Burlington residents and businesses can now choose between three wireline providers of terrestrial broadband service. Burlington Telecom was unable to achieve the penetration level it needed to justify the capital investments it made in its fiber network.

Chattanooga, Tennessee has a city-wide fiber network which officially began offering service in 2010 and is an example of a successful municipal telecommunications company. This network, run by the Electric Power Board of Chattanooga (EPB), a municipal electric and communications entity, offers speeds of up to 1 Gbps symmetrical. Chattanooga began its fiber to the home project in the early 2000s. It was able to complete the project after it received a $111 million dollar stimulus grant in 2009.[74] In 2012, EPB reported it had 35,000 customers purchasing its fiber-based broadband Internet service, which exceeded the city's initial goal of 26,000. EPB has reported an even or positive revenue stream since initializing service.[75]

Although Vermont's experience with municipal telecommunications has proved to be a challenging experience, it is important to note that many municipal projects are succeeding. However, there are distinctions between Chattanooga's and Burlington's experiences that readers should consider. First, Chattanooga was aided by a $111 million dollar federal grant, which greatly offset the capital costs of deploying its network. Chattanooga also achieved and exceeded the subscribership levels it needed to maintain an even balance sheet. These differences go a long way toward explaining why Chattanooga has been successful.

ECFiber

The East Central Vermont Community Fiber Optic Network (ECFiber) is a community broadband entity created through an inter-local contract between 24 towns in the Upper Valley and central Vermont. Currently, ECFiber serves residential and business locations in Barnard, Bethel, Norwich, Pomfret, Royalton, Strafford and Vershire.[76] Through a partnership with the VTA, ECFiber is expanding its service to include locations in Braintree, Brookfield, Chelsea, Pomfret, Randolph, and Woodstock. ECFiber has over 800 customers, with subscribers being added as service expands. The inter-local contract established ECFiber's Member Governing Board, bylaws, governing policies, and elected officers and ECFHoldings, LLC. ECFHoldings, LLC controls the assets and manages day to day operations.

74. EPB also borrowed $219 million to finance the network's $330 million cost. See Edward Wyatt, *A City Wired for Growth*, N.Y. Times, Feb. 4, 2014, at B1.

75. Sean Buckley, *Chattanooga EPB Fiber Defies tough Telecom Odds*. Feb. 24, 2012, Fierce Telecome, http://www.fiercetelecom.com/story/chattanoogas-epb-fiber-defies-tough-telecom-odds/2012-02-24.

76. ECFiber Broadband Service Map, available at ECFiber.net, visited on September 29, 2014.

Because ECFiber offers a fiber to the premises solution, it is able to offer levels of service that outperform competitors; it boasts a service up to 400 Mbps symmetrical. ECFiber is one of only a few providers in Vermont that offers a symmetrical connection, making it ideally suited to small businesses and content creators.

ECFiber began in 2008, with the intent of borrowing $90 million to build an extensive network throughout the then 24 member towns. However, its financing collapsed during the 2009 recession. ECFiber tried unsuccessfully to obtain funding through several federal and state resources, including grants offered through the American Recovery and Reinvestment Act. Today, its funding comes mainly from private investors, many of whom are local. Most recently, ECFiber was able to partner with the VTA to extend service in one of the VTA's business broadband improvement districts that covers Randolph and parts of Brookfield. The VTA also awarded ECFiber a grant of $167,569.00 to extend its network in Strafford and Norwich. This expansion takes advantage of the VTA's recently deployed Orange County Fiber Connector and is slated for completion in 2015.

Because ECFiber offers a fiber to the premises solution, it is able to offer levels of service that outperform competitors; it boasts a service up to 400 Mbps symmetrical.

WISPs

Vermont consumers are served by several Wireless Internet Service Providers. These companies offer fixed wireless broadband service to residents within range of their facilities. Speeds and prices are competitive with wireline offerings. Cloud Alliance, a service provider in the Plainfield area, offers plans ranging from 768/200 Kbps to 6/2 Mbps.[77]

Mobile Wireless Data Service

Vermonters are served by all of the major wireless network providers, but AT&T Mobility and Verizon Wireless have the deepest facilities-based penetration in Vermont. VTel recently launched a wireless service, which is anticipated to be operational statewide. Vermonters may also choose service from a variety of pre-paid service providers and resellers of national service. As discussed more fully in the Voice portion of this chapter, mobile carriers are continuously expanding coverage and upgrading facilities to bring 4G/LTE service to existing coverage areas. The state's permitting regime has allowed expeditious deployment of wireless telecommunications facilities all around the state.

CMRS providers offer both mobile and fixed data plans. Users can access service through a multitude of devices, including tablets, laptops, and smartphones. Data plans offered by CMRS providers generally differ from landline offerings in that customers have data limits and pay data overage fees. Mobile data plans utilize a pricing model based on user consumption rather than speed of service.[78] Mobile data services are often used to compliment users' primary Internet connections. Users rely on mobile service when traveling, but use a wireline connection at home or in

77. Cloud Alliance, http://www.cloudalliance.com/what/residential/, visited on June 20, 2014.

78. Many wireline providers of Internet access services institute data caps, but these caps are usually much higher and are aimed at curbing abusive uses of the Internet connection.

the office. But for rural consumers, mobile data is increasingly becoming a significant source for broadband Internet access.

Public Broadband Initiatives

FirstNet

FirstNet promises to be the first national broadband data network dedicated to public safety. FirstNet is an independent authority within the U.S. Department of Commerce's National Telecommunications and Information Administration and is governed by a 15-member board consisting of the Attorney General of the United States, the Secretary of Homeland Security, the Director of the Office of Management and Budget, and 12 members appointed by the Secretary of Commerce. The FirstNet Board is composed of representatives from public safety; local, state and federal government; and the wireless industry. One of FirstNet's overriding goals is to implement the recommendations of the 9/11 Commission concerning the interoperability of first responder communication.

Vermont is working hard to ensure that it participates in the roll out of the FirstNet network. Vermont has an established FirstNet Board, which coordinates with federal policymakers on FirstNet progress. Vermont's Board is comprised of members of various state agencies, E-911, local law enforcement and rescue, and a VTA representative.

As the project moves forward, adoption and use among Vermont's first responders will be key. Project proponents have provided only vague statements about how first responders will make use of a broadband connection in the field.

The Future of Broadband in Vermont

Vermont must remain competitive in the digital economy. To do this, Vermont will need to aggressively support the expansion and upgrade of advanced telecommunications infrastructure. Act 190 states that the purpose of the state's telecommunications policy and planning statutes is to support measures designed to ensure that every business and residential location in Vermont has infrastructure capable of delivering Internet access with service that has a minimum speed of 100 Mbps and is symmetrical. This goal will require aggressive fiber deployment to much of the state. The next step will be to extend these fiber connections deeper into communities, allowing providers to bring fiber based Internet access service directly to homes and businesses.

The main obstacle Vermont faces in reaching this goal is cost. The cost of bringing service to rural areas may outpace the revenues providers can expect to receive from selling broadband service. State lawmakers have already taken steps to address this issue by activating high cost support and the Connectivity Fund. These two programs will provide much needed support to providers that commit to serving broadband in designated areas. The FCC's reforms will also help support broadband capable networks, while increasing efficiency and accountability within the universal service system.

The new technical benchmarks put forward in this Plan will help direct investment toward the best available technology. By targeting investments at broadband capable networks that meet the new benchmarks, the state can ensure that Vermonters will continue to have access to the best available Internet access infrastructure. As wireless broadband become more widely used, the state will need to consider how best to maintain and improve wireless infrastructure. Policy makers will need to ask whether competition is sufficient to keep wireless infrastructure robust, or if the state will need to target universal service support directly at wireless infrastructure. For the reasons discussed above, the public-private partnership, which has driven key investments thus far, will become even more important in the future.

Video

The ways in which video is delivered have expanded in the 10 years since the *2004 Telecommunications Plan*. In 2004, consumers watched video content in four primary ways: broadcast television, satellite, cable television, and pre-recorded video (i.e. tapes and DVDs). The Internet, however, was already starting to change consumer behavior. In 2005, YouTube, a website dedicated to user-generated content, launched. Today, YouTube gets millions of unique visitors every day. Around the same time, Netflix, a video rental-by-mail company, began offering streaming content to users "on demand." Today Netflix is the largest user of consumer bandwidth and transmits more data than any other single entity. Other online providers of video have since appeared. Despite these new services, Vermonters still depend heavily on cable and broadcast television.

This section primarily discusses video providers with a physical presence in Vermont, but will also discuss national trends in the video industry and new methods of video delivery such as Internet-based content providers. This section will also address the strong presence in Vermont of access management organizations.

Overview of Vermont's Video Market

Thirteen cable providers serve Vermont. Each provider has its own designated franchise territory determined by the Public Service Board. A cable provider receives a CPG for an 11 year period.[79] During this period, the cable provider is obligated to make service available to locations in its service area subject to the Public Service Board's line extension rules. Some cable companies are required by a CPG to adhere to additional cable extension obligations. Appendix Two of this Plan includes a map of cable service areas.

Many Vermonters use satellite television. Satellite television signals can be received anywhere with a clear view of the sky. Satellite offers an amount and type of content similar to cable and some exclusive content.

79. Stowe Cablevision Inc. and Duncan Cable are the exceptions. Neither has a time limit on their CPGs.

In the past 10 years, Vermont has witnessed many mergers and acquisitions of its local cable providers. Comcast has been the main driver. In 2006, Time Warner Cable purchased Adelphia Communications Corporation as it was struggling with Chapter 11 bankruptcy and allegations of securities violations on the part of its leadership. As part of this transition, Comcast Cable assumed Adelphia's Vermont subscribers. Also as part of the transition, Comcast took on obligations to extend its cable plant in Vermont. Comcast brought service to thousands of new locations, including all of Grand Isle. Comcast has also purchased several small Vermont cable firms. Comcast is now the largest cable provider in Vermont.

In the early 2000s, dissatisfaction among Vermonters about the quality of cable television and the lack of access in certain areas, caused localities to seek alternatives to private offerings. As discussed in the Internet Access section of this chapter, Burlington initiated its own telecommunications department, Burlington Telecom (BT). BT offers a range of video packages at competitive rates. Burlington is the only place in Vermont where consumers have a choice between two facilities-based video providers. Elsewhere in Vermont, ECFiber, a community driven entity, considered the idea of offering video. ECFiber has a CPG to provide video service but has not yet begun offering it to consumers.

Burlington Telecom and ECFiber use fiber-based networks to extend service. VTel has also entered the video market, offering video service through its new fiber to the home network.

National Trends in Video

The biggest technological change of the last 10 years has been in the area of high-definition digital content. The number of digital channels cable providers offer has increased. So too has the amount of "on demand" content cable providers offer. In addition, consumers are using digital recorders. Consumers no longer need to watch at an appointed time to see the "must see" content on the major networks.

Many consumers are "cutting the cord."[80] Despite the growth in consumer demand for video content, the number of cable video customers has decreased. Here in Vermont, the number of cable subscribers has decreased from 139,275 in 2009 to 132,373 in 2012. Consumers are increasingly turning to other sources of video content, including online platforms such as Netflix and Hulu. Online media outlets offer content "on demand" and at prices below the typical cable package. As stated above, Netflix's streaming service has grown exponentially in recent years. This year, Netflix entered into an interconnection agreement with Comcast to gain direct access to Comcast's network, obviating the need to send data through backbone providers, such as Cogent, to reach Comcast customers.

Mergers and acquisitions have dominated cable related headlines in recent years. Comcast acquired a majority stake in the media conglomerate,

80. Referring to the physical cable connection into one's residence or business, but essentially dropping the monthly cable TV subscription.

NBCUniversal in 2011.[81] Through this acquisition, Comcast has positioned itself to be not only the largest cable provider in the United States, but also one of the largest content producers in the world. The sale expanded Comcast's market share both horizontally and vertically, giving Comcast control over a large segment of the content production industry, and, along with it, copyright and retransmission rights of NBC content. To gain approval from the United States Department of Justice, Comcast agreed to adhere to the FCC's net neutrality rules that were in place in 2011 for a period of seven years.

The Comcast merger with Time-Warner has drawn controversy from consumer groups who say that Comcast will be able to wield its market power to suppress competition in the content production and online video industries. Net neutrality advocates argue that in the absence of net neutrality rules, Comcast will use its market power to impose restrictions on Internet users, such as blocking content, imposing data caps, and throttling speeds when users access certain edge providers.[82] Comcast has responded in the press that the merger will not harm competition because Comcast and Time Warner do not directly compete in the cable market. Both Comcast and Netflix denied that their agreement to give Netflix direct access to Comcast's network had anything to do with accusations that Comcast was inhibiting data stream originating from Netflix.

Comcast is Vermont's largest cable provider. Should it successfully merge with Time Warner, Comcast will likely increase its presence in Vermont. The merger will involve a sale of facilities to and from Charter Communications, Vermont's second largest cable provider. As part of the merger agreement, Comcast has also agreed to sell some of its subscriber base in other states to Charter Communications and will take on other Charter accounts. Should federal authorities approve the sale, Charter Communications and Comcast will seek to transfer Charter's Vermont subscriber accounts to Comcast. Comcast will sell its accounts in other areas of the country to Charter. Charter is expected to net 1.3 million accounts nationwide from Time Warner, and the two companies will swap an estimated 1.6 million accounts. Charter will no longer have a presence in Vermont.

AT&T also announced possible acquisition of DirecTV for $48.5 billion. By acquiring DirecTV, AT&T would be able to offer consumers bundled packages of TV, phone, and Internet similar to popular bundle packages offered by most cable companies. Both deals must be approved by the FCC and the Department of Justice before taking effect.

81. Comcast currently owns 100% of NBCUniversal.

82. Edge providers are providers of Internet based services and applications. Edge providers include just about everything found on the Internet, ranging from major providers such as Amazon, iTunes, Netflix, and Facebook to simple websites.

Public, Educational, and Government TV

Public, Educational, and Governmental (PEG) access is recognized by Vermont state law as an important component of cable systems. PEG cable stations provide an outlet for community members and organizations to produce and present non-commercial programming of interest to the local community. PEG access became a mainstay of cable television when Congress passed the *Cable Communications Act of 1984*. The law allowed local franchising authorities (such as the Public Service Board) to require cable companies to set aside channels for locally generated non-commercial content. Vermont has a rich history of strongly supporting PEG stations and PEG content. Vermont has 26 access management organizations (AMOs) dedicated to PEG content. These organizations are essential to cable customers who rely on AMOs for broadcasts of local government meetings and hearings, school information, and local arts and entertainment offerings.

AMOs receive support directly from cable customers. A portion of each customer's monthly cable payment is distributed to the local PEG station(s) serving the customer. AMOs use this funding to produce content and run operations. Surveys conducted by the Department of Public Service show that consumers watch public access regularly. The majority of consumers in Charter Communications' territory, for instance, watch public access programming at least once per month.[83]

PEG stations' value to the communities they serve go beyond their broadcasts. The ability of PEG stations to originate live programming from a variety of locations around the community adds value to the PEG programming experience. Local government meetings and candidate forums are examples of how PEG programming, and especially live PEG programming, contributes to democracy in the community. Furthermore, PEG access can serve the public by being more than just a place to play tapes. When PEG access includes facilities and training for members of the community to learn video production, it contributes to media literacy in the community.

During the comment period of this Plan, the majority of comments received by the Department of Public Service stressed the value of Public access television. The comments focused on a number of benefits AMOs provide. AMOs give community members access to their facilities and help residents interested in video production learn how to produce content. AMOs also cover a wide range of community events that would otherwise not be broadcast. The decline in cable subscribership and the shift to online content has caused some in the AMO community to question the continued viability of PEG television as video subscriber funded entities.[84] PEG stations are facing technological hurdles. Many stations have not made a transition to high definition, causing a technological disparity between PEG television and other networks.[85]

83. 2014 Charter CPG Renewal Survey Results, June 2014.
84. Email of Jamie Dimick to the Department of Public Service. March 20, 2014.
85. Email of Lisa M. Byer to the Department of Public Service, March 21, 2014.

The Future of Video

The existing physical cable plants are important to Vermonters for two reasons. First, cable television serves as an important source of local and national news and entertainment. Second, the same lines that carry video also carry data, making cable facilities indispensable to Vermonters' Internet access needs. As discussed in the Broadband chapter of this Plan, coaxial cable facilities currently provide the second fastest broadband Internet in the state behind fiber to the premises. Vermonters depend on these facilities and will require that they are maintained and expanded in conformance with Board rules.

Broadening the reach of cable access will be important to the future of the system. This will increase the number of addresses able to meet the state's 2024 technical benchmarks for broadband access as well as the ability of residents to access local content.

Cable subscription rates are on the decline. However, nationwide, video consumption is increasing. As Americans look to other sources of video content, cable companies will play an important role in determining the range of access consumers will have to that content. Consolidation of the cable industry raises questions about consumer access to edge content providers and those providers' access to consumers. Rules governing retransmission and the application of common carriage principles to broadband providers will become ever more important as the market continues to consolidate with respect to providers and services.

Cable subscription rates are on the decline. However, nationwide, video consumption is increasing.

CHAPTER 2

Telecommunications Almanac

Introduction

The Telecommunications Almanac provides data about the status of telecommunications infrastructure and services in Vermont through 2012. The purpose of the Almanac is to give a snapshot of the current state of telecommunications in Vermont and to provide the data from which the Department of Public Service has developed the plans for meeting emerging trends related to telecommunications technology, markets, financing, and competition pursuant to its statutory reporting obligations under 30 V.S.A. § 202d. The Almanac includes statistical data covering a wide range of topics as well as analysis of that data. The data contained in this report helps inform state policymakers on the direction of future telecommunication policy and regulation.

Telephone Service

Vermonters are served by 10 incumbent local exchange carriers (ILECs).

Vermonters are served by 10 incumbent local exchange carriers (ILECs). An ILEC provides telephone service to residents in a specific geographic region. In addition to providing retail service, ILECS have an obligation to open their facilities to, and carry calls from, competitor service providers at competitive rates. Vermonters are also served by competitive local exchange companies (CLECs) and several market substitutes for voice service, such as Internet-based voice communication. The following subsections provide information and data on telephone service in Vermont. Subsection (a) provides data on telephone usage and penetration. Subsection (b) focuses on retail service, while section (c) provides information on wholesale service and rates. Subsection (d) presents data on universal service fund support and disbursements to Vermont.

Telephone Penetration

The telephone penetration statistics measure the availability of telephone service within the home. These statistics are collected by the U.S. Census Bureau as part of its Current Population Survey (CPS). The CPS is a staggered panel survey in which the people residing at particular addresses are included in the survey for four consecutive months in one year and the same four months in the following year.[86] The CPS survey asks participants specific questions about their access to voice service within the home.[87] Once collected, the Federal Communications Commission (FCC) publishes this data in the Universal Service Monitoring Report on an annual basis.

86. FCC, *Universal Service Monitoring Report* (December 2012)

87. Specifically, the survey asks "Does this house, apartment, or mobile home have telephone service from which you can both make and receive calls? Please include cell phones, regular phones, and any other type of telephone." Thus telephone penetration includes any in home access to voice service that allows a member of the household to make and receive voice communication.

With a 97.8% penetration rate, Vermont ranks ninth in the nation for telephone penetration. This is well above the 95.9% national average, and on par with penetration rates throughout New England.[88] The data show a consistent penetration rate from year to year. However, there was a 0.3% decrease from 2011 to 2012. Nonetheless, the data collected between 1984 and 2012 show the penetration rate trending upward.

Table 1 shows telephone penetration among the lowest income households is 94.9%, which exceeds the national average of 92%. Since the publication of the *2009 Almanac*, Vermont has slipped from the number one position among the 50 states to number eleven. This downward trend is due to other states increasing their penetration rates among low income households. Vermont's penetration rate among low income households has remained around 95% since 2007. Vermont's near ubiquitous penetration rate is a result of government policies such as Lifeline, Link-Up, and the Universal Service Fund, which have helped maintain a robust telecommunications network and affordable rates for consumers.

97.8%
PENETRATION RATE

Vermont ranks ninth in the nation for telephone penetration.

TABLE 1

2012 Percentage of Household Telephone Penetration by State and Income

State	$9,999 or Less	$10,000 to $19,999	$19,999 to $29,999	$30,000 to $39,999	$40,000 or More	All Households
Connecticut	95.20%	99.50%	97.60%	98.20%	99.60%	98.30%
Maine	97.40%	98.60%	99.10%	97.90%	99.10%	98.50%
Massachusetts	93.70%	97.10%	99.60%	100%	98.80%	97.80%
New Hampshire	93.90%	96.40%	97.90%	99.60%	99.70%	97.90%
New York	89.10%	92%	94.80%	97%	96.90%	93.60%
Rhode Island	92.20%	96.70%	97.20%	99.50%	98.50%	96.40%
Vermont	94.90%	97.10%	99.70%	98.30%	98.90%	97.80%
United States	92%	95.30%	96.90%	97.80%	98.30%	95.90%

Source: *Universal Service Monitoring Report 2012*, Table 3.8 by Federal and State Staff for the Federal-State Joint Board on Universal Service.

Retail Service

As Table 2 (on pg. 49) shows, non-ILEC entities own 35% of the active lines in Vermont. This is much lower than the New England and New York average of 49% and below the national average of 39%. Several factors may account for the below average CLEC market share in Vermont, including low population density, and the high cost of providing service in rural areas.

Table 3 (on pg. 49) shows some of the various factors included in the calculation of consumers' local telephone bill, current as of the end of

88. The New England average is 97.8%.

TABLE 2

Total-End-User Switched Access Lines and VoIP Subscriptions in New England and New York

As of June 30, 2012 (in thousands)

State	ILECs				Non-ILECs				Total	NON-ILEC Share % of total
	Switched Access Lines	VoIP Purchased as		Total	Switched Access Lines	VoIP Purchased as		Total		
		Stand-alone	Bundled with Internet			Stand-alone	Bundled with Internet			
Connecticut	995	0	116	1,111	197	67	559	823	1,934	43
Maine	401	0	0	401	137	13	144	293	694	42
Massachusetts	1,613	1	244	1,858	1,174	156	968	2,299	4,147	55
New Hampshire	304	0	0	304	124	39	240	403	708	57
New York	4,390	2	551	4,943	1,856	258	3,170	5,283	10,226	52
Rhode Island	195	0	50	245	238	25	92	355	600	59
Vermont	234	0	0	234	45	012	70	127	362	35

Source: FCC, *Local Telephone Competition: Status as of June 30, 2012*, June 2013.

TABLE 3

2012 Vermont Independent Local Exchange Carriers' Local Rates

Company	Rate per minute of local use				Fee for Basic Dial Tone		Cap on total per month local fees	
	Home Exchange		EAS					
	Peak	Off-Peak	Peak	Off-Peak	Residential	Business	Residential	Business
TOC of VT (FairPoint Communications)	$0.022	$0.005	$0.000	$0.000	$13.15	$32.00	$39.50	$75.27
VTEL	$0.022	$0.005	$0.022	$0.005	$12.70	$23.25	$25.00	$35.00
FairPoint of Vermont (formerly Northland)	$0.010	$0.005	$0.025	$0.005	$13.20	$23.65	$24.00	$38.00
Waitsfield Telecom* (WCVT)	$0.010	$0.005	$0.022	$0.010	$13.90	$26.40	Home $13.00 EAS $15.00	Home $20.00 EAS $42.00
Champlain Valley Telecom* (WCVT)	$0.010	$0.005	$0.022	$0.010	$13.90	$26.40	$28.00	$38.00
Shoreham Telephone	$0.014	$0.005	$0.020	$0.005	$6.15	$10.25	$30.00	$30.00
Topsham Telephone	$0.000	$0.000	$0.035	$0.015	$12.15	$19.37	$22.00	$22.00
Franklin Telephone**	$0.000	$0.000	$0.030	$0.010	$10.00	$18.00	none	none
TDS Ludlow Telephone	TDS Co's have declining rate structure, 300 minutes or less: No Charge; 301-600 minutes: 2.5 cents; 601-900 minutes: 1.5 cents; 901+ minutes: 0.5 cents. Exception: Northfield charges 1.5 cents for 301-900.				$12.50	$21.65	none	none
TDS Northfield Telephone					$13.40	$22.15	none	none
TDS Perkinsville Telephone					$12.90	$21.65	none	none

Notes: Dial tone rates do not include mileage charges, where applicable. Residential caps are in addition to dial tone rates. Residential rates reflect rate with lowest level of included usage.

*Waitsfield & Champlain Valley Telecom has different caps for their Waitsfield Telecom and Champlain Valley Telecom exchanges and have thus been divided in the above table.

**Franklin Telephone has a different basic dial tone fee for seasonal (May-October) residential customers of $15.00.

Source: 2012 Annual Reports

TABLE 4

2012 Incumbent Local Exchange Carriers' Local Minute Charges

Company	Residential Charges				Multi-Line Business Charges			
	100 local minutes	1000 local minutes	1500 local minutes	2000 local minutes	100 local minutes	1000 local minutes	1500 local minutes	2000 local minutes
TOC of VT (FairPoint Communications)	$21.43	$27.61	$31.05	$34.49	$40.62	$48.81	$50.24	$53.68
VTel*	$22.08	$28.13	$32.26	$39.13	$36.05	$41.54	$45.67	$52.54
Northland Telephone (FairPoint)	$22.27	$32.58	$38.31	$44.03	$34.48	$44.79	$50.52	$56.25
Waitsfield and Champlain Valley Telecom	$22.61	$33.38	$39.36	$45.34	$39.07	$49.84	$55.82	$61.81
Shoreham Telephone	$15.11	$25.10	$30.65	$36.20	$22.50	$32.49	$38.04	$43.59
Topsham Telephone**	$21.41	$32.87	$39.23	$42.54	$31.99	$43.45	$49.81	$53.12
Franklin Telephone	$18.97	$28.13	$33.22	$38.32	$30.34	$39.51	$44.60	$49.69
TDS Ludlow	$20.90	$33.63	$36.18	$38.72	$33.04	$45.77	$48.31	$50.86
TDS Northfield	$21.41	$31.09	$33.63	$38.18	$33.55	$43.22	$45.77	$48.31
TDS Perkinsville	$20.90	$33.63	$36.18	$38.72	$33.04	$45.77	$48.31	$50.86

Calculation: rates include all fees and charges except state sales tax and federal excise tax. Cost calculated with half peak local usage minutes and half off-peak minutes. For companies with different home and EAS rates, calculated with half of the peak and off-peak minutes at EAS rates.

*VTel charges assume customer subscribes to PlainTalk package when cost-effective. PlainTalk includes 1200 minutes of local calling. In this table, it is cost effective at all but the 100 local minute's interval.

**Topsham Telephone's cap goes into effect at the 2000 local minute level of use for both residential and business customers.

Source: 2012 Annual Reports.

2012. Consumers with local telephone service are generally charged a basic flat fee to maintain dial tone. Added to this flat fee are per minute charges, which may vary by time of day and whether the call extends into the caller's extended area service (EAS) local calling area. The flat fee and per minute local charges—often referred to as local measured service—are regulated by the Vermont Public Service Board. Most providers include a cap on the sum of per minute local charges a customer can accrue in a single month.

Table 4 (above) shows how much incumbent carriers charge customers for varying levels of local telephone use. In addition to per minute charges shown in Table 3 that telephone companies charge, consumers typically see a subscriber line charge (SLC), Federal Universal Service Charge, and a Vermont Universal Service Fund (VUSF) charge. Table 4 attempts to capture what a typical bill would look like for each level of service listed. These calculations exclude state and federal taxes.

The government regulated fees mentioned above help maintain affordable rates for telephone users. The SLC is a fee telephone companies are allowed to charge to maintain a consumer's line. This fee is capped by the FCC. Currently, the cap is set at $6.50 for residential lines and $9.20 for multi-line

TABLE 5

Changes to ILEC Dial Tone and Local Usage Rates 2005, 2010, & 2012

Company	Residential Monthly Fee for Basic Dial tone			Business Monthly Fee for Basic Dial tone			Local Measured Service Rate (per minute of use)					
	2005	2010	2012	2005	2010	2012	2005	2010	2012	2005	2010	2012
TOC of VT (FairPoint, formerly Verizon)	$13.15	$13.15	$13.15	$32.00	$32.00	$32.00	$0.0220	$0.0220	$0.0220	$0.0220	$0.0000	N/A
VTel	$12.70	$12.70	$12.70	$23.25	$23.25	$23.25	$0.0220	$0.0220	$0.0220	$0.0220	$0.0220	$0.0220
FairPoint of Vermont (formerly Northland)	$13.20	$13.20	$14.00	$23.65	$23.65	$23.65	$0.0100	$0.0100	$0.0100	$0.0100	$0.0250	$0.0250
Waitsfield and Champlain Valley Telecom	$13.40	$13.40	$13.90	$26.40	$26.40	$26.40	$0.0100	$0.0100	$0.0100	$0.0220	$0.0220	$0.0050
Shoreham Telephone	$6.15	$6.15	$16.65	$10.25	$10.25	$10.00	$0.0137	$0.0137	$0.0137	$0.0200	$0.0200	$0.0200
Topsham Telephone	$11.35	$12.15	$12.15	$18.10	$19.37	$19.37	$0.0000	$0.0000	$0.0000	$0.0350	$0.0350	$0.0350
Franklin Telephone	$10.00	$10.00	$10.00	$18.00	$18.00	$18.00	$0.0000	$0.0000	$0.0000	$0.0300	$0.0300	$0.0300
TDS Ludlow	$29.00	$12.90	$12.90	$38.00	$21.65	$21.65	No Change in rates from 2005 to 2012.TDS companies have a declining rate structure. 300 minutes or less: 0.0 cents; 301-600 minutes: 2.5 cents; 601-900 minutes: 1.5 cents; 901+ minutes: 0.5 cents. Exception: Northfield charges 1.5 cents for 301-900.					
TDS Northfield	$29.00	$13.40	$13.40	$38.00	$22.15	$22.15						
TDS Perkinsville	$29.00	$12.90	$12.90	$38.00	$21.65	$21.65						

Notes: Dial tone rates do not include mileage charges, where applicable. Rates not available for grayed-out fields. Residential rates reflect rate with lowest level of included usage.
Source: ILEC Annual Reports.

businesses.[89] The SLC fee goes directly to the telephone company, despite being called the "federal subscriber line charge" by some companies. The SLC is not a tax, and companies are not obligated to charge a SLC. While providers may choose not to charge this or to charge less, each independent incumbent carrier in Vermont is a member of the National Exchange Carrier Association (NECA) and pays the full SLC amount into a pool regardless of the fee actually charged consumers.

Table 5 (above) shows ILEC rate changes since 2005. As the table shows, ILEC charges for basic dial tone have remained mostly unchanged since 2005. Some companies have increased their charges, while others have reduced the price of their fixed monthly rates. Per-minute rates have increased slightly, but the average local measured service (LMS) rate still remains under $0.02 per minute.

Intercarrier Compensation

Table 6 (on pg. 52) provides data on intrastate wholesale access charges. Access charges are fees charged to carriers connecting long distance calls to a local telephone company's local network and customers. Carriers providing long distance service pay for access on both the originating end and terminating end of a call. Although access charges tend to be expressed in terms of per-minute rates, they are, in fact, a variety of usage- and non-

89. The first residential line is capped at $6.50. Companies may charge higher rates for subsequent lines.

TABLE 6

2012 Incumbent Telephone Company Intrastate Access Charges

Rate Element	Company									
	TOC of VT (Fairpoint Comm.)	Vermont Telephone (VTel)	Fairpoint of Vermont (formerly Northland)	Waitsfield and Champlain Vallery Telecom	Shoreham Telephone	Topsham Telephone	Franklin Telephone	TDS Ludlow	TDS Northfield	TDS Perkinsville
CCL Originating per min.	N/A	$0.006900	$0.004418	$0.003450	$0.000000	$0.006900	$0.006900	$0.004740	$0.004740	$0.004740
CCL Terminating per min.	N/A	$0.004034	$0.036450	$0.003593	$0.000000	$0.043300	$0.023397	$0.043300	$0.043970	$0.043300
Local transport - per mile per min.	$0.000127	$0.007500	$0.000195	$0.000344	$0.000165	$0.000423	$0.000423	$0.000423	$0.000423	$0.000423
Local switching per min.	$0.009700	$0.013992	$0.013992	$0.034341	$0.001160	$0.035200	$0.035200	$0.030000	$0.030000	$0.030000
Local transport - Circuit Connection - per min.	$0.000731	$0.045140	$0.004802	$0.004892	$0.008160	$0.008400	$0.008400	$0.008400	$0.008400	$0.008400
Composite originating per min.	$0.018178	$0.141032	$0.025162	$0.046123	$0.011300	$0.054730	$0.052750	$0.047370	$0.047370	$0.122970
Composite terminating per min.	$0.018178	$0.138166	$0.057194	$0.046266	$0.011300	$0.091130	$0.069247	$0.085930	$0.086600	$0.161530
Total originating and terminating per min.	$0.036356	$0.279198	$0.082356	$0.092389	$0.022599	$0.145860	$0.121998	$0.133300	$0.133970	$0.284500

Assumes 10 miles of local transport, except 61 miles for TOC of VT (FairPoint Comm), 5.32 miles of local transport for Franklin and 12 miles for Shoreham. Does not include non-usage sensitive elements or tandem switching. Also assumes measured Verizon host-remote local termination only.

Source: 2012 Annual Reports.

usage sensitive charges. The Public Service Board regulates intrastate access charges. The following table shows access rates for ILECs.

Universal Service

Consumers are charged a fee for the Federal Universal Service Fund. Universal service is the principle that all consumers should have access to telecommunication services at just and reasonable rates. The Universal Service Fund helps support service in high cost areas, such as low density, rural towns in Vermont. This fund has been an important part of telecom regulation since 1934 when the *Telecommunications Act* established the first universal service policy. Today all consumers are charged a monthly fee that is applied to the Universal Service Fund. This charge is calculated as a percentage of a consumer's interstate calling portion of the bill. The Universal Service Fund supports four key programs:

- **Connect America Fund:** A fund dedicated to the build out of broadband services in underserved areas.
- **Lifeline:** a fund dedicated to reducing the cost of phone service for low income consumers
- **Schools and Libraries:** a fund that subsidizes the cost of telecommunications services for schools and libraries.
- **Rural Health Care Program:** a fund that assists rural health care providers with the cost of telecommunications services.

TABLE 7

Universal Service Fund Annual Payments and Contributions by Support Mechanism, 2011

(In thousands of dollars)

State	Payments from USF to Service Providers						Estimated Contributions		Estimated Net Dollar Flow to State
	High Cost Support	Low Income Support	School & Libraries	Rural Health Care	Totals				
					Amount	% of Total	Amount	% of Total	
Connecticut	$453	11,561	21,103	$0	33,116	0.41%	109,984	1.33%	-76,868
Maine	30,044	11,478	6,995	669	49,145	0.60%	36,294	0.44%	12,853
Massachusetts	2,088	29,693	26,292	129	58,203	0.71%	194,274	2.35	-136,071
New Hampshire	9,381	2,215	2,601	18	14,215	0.17%	37,958	0.46%	-23,743
New York	41,715	120,928	148,954	783	322,379	3.95	552,494	6.69%	-230,114
Rhode Island	29	3,425	9,014	0	12,468	0.15%	27,646	0.33%	-15,178
Vermont	18,298	2,477	1,827	46	22,647	0.28%	19,567	0.24%	3,084
National Total	4,031,268	1,750,728	2,232,539	141,013	8,155,548	100%	8,262,633	100%	-107,085

Source: FCC, *Universal Service Monitoring Report*, CC Docket No. 98-202, 2012

Table 7 (above) shows universal service support contributions by New England and New York service providers and resulting disbursements. As the table shows, Vermont receives a net distribution meaning that service providers receive more money in contributions than Vermonters pay into the Universal Service Fund. States with a higher proportion of designated rural areas generally see a positive estimated net dollar flow.

Vermonters are also charged a fee for the Vermont Universal Service Fund (VUSF). The purpose of the VUSF is to support the Vermont Telecommunications Relay Service (VTTRS), telephone Lifeline Assistance, and the development of state-wide enhanced 911 emergency service (e-911). To finance these programs, Vermont law imposes a broad based charge (VUSF charge) on all telecommunications services that interact with the public switched network. This charge is calculated as a percentage of a consumer's entire bill. The Public Service Board sets the rate for VUSF charge, which is currently 1.82%.[90]

The revenue base—that is, the total value of telecommunications services subject to the charge—fluctuates from year to year. Each year before it sets the surcharge rate the Board makes an estimate about what the revenue base will be in the following year. Since the surcharge is based on a projection, the amount of revenue projected in the budget will never exactly equate to the actual revenue generated. Each year the Board issues an order that lays out the budget for the following year as well as the projected revenue and resulting VUSF assessment rate. The total actual income for the year ending June 30, 2012 was $5,878,694. This figure includes provider contributions as well as interest,

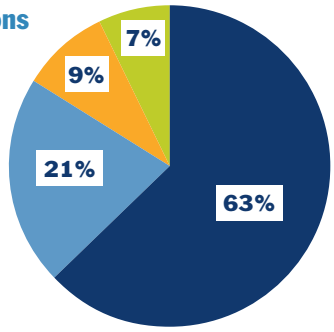
90. *See* 30 V.S.A. § 7523(a).

charges, performance assurance penalties, and other income. Figure 1 (at right) breaks down the total VUSF assessments for fiscal year 2011/2012 by service provider type.[91]

In 2011/1012 the VUSF disbursed $7,183,142 to its programs and administrative and operational costs. Figure 2 (at right) relates the components and their proportion of the fund expense projected for 2013.

FIGURE 1

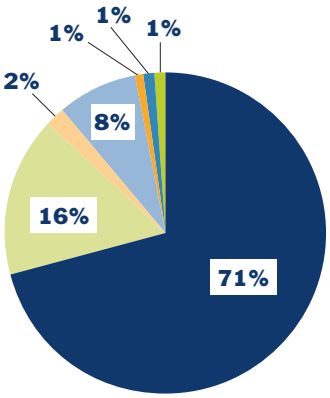
Percentage of VUSF Net Contributions by Service Provider Type (FY 2011/2012)



Source: QSI Consulting, *Assessment of the Vermont Universal Service Fund*, May 2013.

FIGURE 2

VUSF Programs



Source: QSI Consulting, *Assessment of the Vermont Universal Service Fund*, May 2013.

Cable and Video

Vermont is served by 13 cable providers that, for the most part, have exclusive franchises within their respective service territories. Table 8 (on pg. 55) shows the number of cable subscribers for years 2006 through 2012. Cable subscribership has remained fairly consistent over this period with subscribership peaking at 139,275 in 2009.

These companies have franchise rights to provide service in designated areas. The number of customers each company serves is partly a function of its service territory. Companies with less territory have a smaller customer base. The Public Service Board has exclusive franchising authority under state law and provides cable companies with the license to operate in a designated service territory for a period of time, usually 11 years. Subscribership rates have remained fairly consistent from year to year but have been trending downward since 2009.[92] Many cable companies now offer multiple services, such as telephone and broadband Internet access, which have helped increase revenue despite flat or declining video subscribership. Additionally, Comcast, with its acquisition of NBCUniversal, has branched into the content market.

Cable pricing and offerings have remained largely the same over the past few years, with cable prices remaining stable or decreasing slightly. Many cable providers have increased the number of channels they offer as part of their basic service. It is also worth noting that many cable companies offer cable bundled with telephone and broadband access, which is often cheaper than buying each service separately.

91. Assessments for fiscal year 2011/2012 totaled $5,388,457.

92. Vermont cable subscribership peaked in 2003 when subscribership totaled 139,563.

TABLE 8

Vermont Cable Subscribers

Company	2006 subscribers	2007 subscribers	2008 subscribers	2009 subscribers	2010 subscribers	2011 subscribers	Year 2012
Comcast Cable (formerly Adelphia Cable)	100467	106253	110505	113796	113213	112826	111585
Burlington Telecom	669	1909	3049	3275	2803	2384	2440♀
Charter Communications (formerly Helicon Cable)	12624	11226	11031	10921	10747	10487	8888
Duncan Cable TV	3032	2977	2980	2963	2852	2855	2815
Jeffersonville Cable TV	344	347	347	330	342	342	342
North Country Cablevision*	964	1063	1040	N/A	N/A	N/A	N/A
Smugglers Notch CATV	565	638	638	638	638	638	638
Southern Vermont Cable	1809	1793	322	2006	1977	1938	1914
Topsham Cable					15	15	Not Reported
Stowe Cablevision	1025	1054	1077	1098	1130	1130	1130
Trans-Video, Inc.	1227	1308	1135	1100	2142	1068	2336
Waitsfield-Fayston Cable	3383	3528	3051	2947	2915	2796	2725
PC One Cable	213	204	940**	191	146	146	***
Total Cable Connections	126322	132300	135175	139275	138920	136625	132373

Source: Annual Reports 2006 - 2012

* North Country Cablevision sold to Adelphia/Comcast in 2008.

** White Mountain Cablevision reported combined Vermont and New Hampshire subscribers in 2008 only, accounting for this spike.

*** As of July 31, 2013 PC One was delinquent with its 2012 Annual Report and has not otherwise reported subscriber information.

♀ Represents City of Burlington average for 2012.

Broadband Service Availability and Adoption

Computer and Internet Adoption

Computer and Internet usage have steadily increased over the past decade, as Table 9 (on pg. 56) shows. Of Vermonters polled 85.9% reported that there is a personal computer in their household. This is a 6% increase from a decade ago. Internet in the home has likewise increased. In 2002, 74% of Vermont households reported having internet access. By 2012 that number had increased to 87.6%, surpassing the number of those who claim to have a computer in the home.

Broadband Penetration and Availability

All Vermont households have access to the Internet so long as they have a phone line. Approximately 88% of households report having a connection to the Internet. Broadband deployment, however, is less ubiquitous. Of Vermont households 76% reported having broadband as of 2012. This number is up from 16% in 2003 and Broadband subscription has increased

TABLE 9

Vermont Households with Computer, Internet, and Broadband as of 2012

Poll Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Computer	76%	80%	79%	83%	80%	81%	80%	83%	83%	83%	83%	86%
Internet	68%	74%	73%	70%	75%	75%	77%	83%	82%	81%	81%	88%
Broadband	9%	18%	16%	27%	31%	41%	51%	63%	67%	69%	72%	76%

Source: 2012 Vermont Poll, Center for Rural Studies at UVM.

TABLE 10

Percentage of Connections by Downstream Speed by State as of June 30, 2012

(Connections over 200 kbps in at least one direction)

State	Over 200 kbps Upstream and				
	% over 200 kbps Downstream	% at least 768 kbps Downstream	% at least 3 Mbps Downstream	% at least 6 Mbps Downstream	% at least 10 Mbps Downstream
Connecticut	95.9	77.8	42.8	35.3	23.9
Maine	93.2	80.4	46.7	37.8	11.5
Massachusetts	95.5	76.8	50.7	43.7	33.8
New Hampshire	93.3	69.6	51.2	42.8	31.9
New York	95.0	76.0	45.3	37.1	25.7
Rhode Island	95.7	79.9	55.2	46.2	35.1
Vermont	93.1	76.7	44.6	33.4	18.7
United States	95.1	78.7	47.6	33.7	19.3

Source: Internet Access Services: Status as of June 30, 2012 by F.C.C. Wireline Competition Bureau.

steadily over the past ten years, but has slowed as the subscription rate meets the broadband availability. State and private efforts have focused on increasing the availability of broadband in areas not currently served with the hope that Vermont will soon have broadband access throughout the entire state.

Broadband speeds are also on the rise. The *2004 Telecommunications Plan* defined the minimal technical requirements for broadband service. The plan called for minimum benchmark download speed of 768 Kbps and an upload speed of 200 Kbps. As of June 2012, 76.7% of Internet connections in Vermont supported speeds of at least 768 Kbps downstream and 200 kbps upload.

Broadband coverage continues to expand in Vermont. The Public Service Department and the Department of Economic Development, with the cooperation of service providers have mapped coverage for the different types of Broadband platforms.

TABLE 11

Selected Consumer Broadband Prices 2014

Provider	Service	Region	Monthly Rate	Speed (download/ upload)	Note
Comcast Cable	Cable modem	Vermont, various U.S.	$39.99	25 Mbps/ 5 Mbps	Offer includes price of 39.99 for the first 12 months. Price increases to 54.99 thereafter. Price does not reflect installation and equipment charges
Telephone Operating Company of VT (FairPoint)	DSL	Vermont, various U.S.	$49.99	15 Mbps/ 1 Mbps	Requires 1 year contract. Requires phone service, $100.99 with phone and DSL.
VTel	DSL or Fiber	Southern Vermont	$34.95	24 Mbps (up to 1 Gbps where fiber is available)	Price reduced to $29.95 per month when bundled with voice services. Installation fee: $99 ($0 with 1 year commitment)
SoVerNet (National Mobile)	DSL	Vermont	$50.00	5 Mbps/ 1 Mbps	$37.50 charge for modem, $100 installation fee (waived with one year contract).
Burlington Telecom	Fiber	Burlington	$39.00	5 Mbps/ 5 Mbps	Installation fee: $65
FairPoint of Vermont	DSL	Northern Vermont	$46.99	7.1 Mbps/ 1 Mbps	Requires 1 year contract, $57.99 without contract.
Waitsfield & Champlain Valley Telecom	DSL	West Central Vermont	$42.95	6 Mbps/ 1 Mbps	$50 non-refundable installation fee. Consumer has the option of purchasing a self-installation kit. Rates may be reduced if included with a bundle.
Great Auk Wireless	WISP	Vermont and New Hampshire	$39.95	5 Mbps/ 1 Mbps	Activation fee: $29.95
Kingdom Connection	WISP	North Eastern Vermont	$99.95	1536 Kbps download	Requires 1 year contract. Installation fee: $300. Equipment rental fee: $8.95/mo.
Verizon	Mobile Broadband	various U.S.	$60.00	5-12 Mbps/ 2-5 Mbps	Requires a 2 year agreement. Includes 3 GB data limit with overage fees
AT&T	Mobile Broadband	various U.S.	$70.00	5-12Mbps/ 2-5 Mbps	Requires 2 year contract. Plan includes 4 GB limit and overage fees. Other plans with additional limits are available.
Hughes Network Systems, LLC	Satellite	worldwide	$39.99	5 Mbps/ 1 Mbps	Activation fee: $99. Equipment leasing fee: $9.99/ mo. Rate reverts to $49.99 after 3 months.

* FCC adopted a minimum speed of 4 Mbps download and 1 Mbps upload to be considered "broadband" in its Sixth Broadband Deployment Report, released in July 2010. All plans listed are the least expensive available from providers that meet those speeds or the highest speed available from the provider.

Source: Prices were web-published rates in effect April 2014. Prices are for services with speed as described. Other service levels/speeds may be offered at other prices. Prices for Great Auk, SoVerNet, and FairPoint were obtained by calling each company.

♀ speeds assume 4G service.

Broadband Pricing

Table 11 (above) lists the pricing of select broadband providers available in Vermont. This table, while not an exhaustive list of providers, does represent the full range of plans available to Vermonters.

National and State Wireless Trends

Competition and Market Consolidation

The wireless mobile market has undergone significant change over the past decade. Two of the most notable changes are the introduction of mobile technology for data and the proliferation of nationwide networks. Tables 12 and 13 (below) show the number of voice subscribers increased from 2008 to 2012 at the same time as consumers report having more Internet-capable devices. Another notable change, as shown in Table 14 (on page 59), is the consolidation of market share into the hands of four nationwide providers:

TABLE 12

New England and New York Wireless Voice Subscribership: 2008-2012 (in Thousands)

State	2008	2009	2010	2011	2012
Connecticut	2959	3047	3,192	3305	3385
Maine	972	1006	1040	1090	1195
Massachusetts	5624	6027	6367	6419	6638
New Hampshire	1045	1075	1141	1171	1215
New York	17260	18193	19303	19938	20410
Rhode Island	874	880	906	935	1016
Vermont	421	398	431	471	521
Nationwide	255,729	265,332	278,918	290,318	303,052

Note: Subscriber figures collected as of June 30 of respective year.

Source: Wireless Subscriber figures: FCC Wireline Competition Bureau, Local Telephone Competition Report, released June 2013.

TABLE 13

Mobile Wireless Subscribers with Full Internet Access as of December 31, 2011 (in Thousands)

State	Internet Capable Devices in Service	Subscribers with Full Internet Access
Connecticut	2,285	1,732
Maine	586	373
Massachusetts	4,006	3,084
New Hampshire	691	482
New York	11,789	9,301
Rhode Island	607	447
Vermont	311	201
Nationwide	183,666	142,066

Source: FCC, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless Including Commercial Mobile Service (16th Report), March 2012.

Verizon, AT&T, Sprint, and T-Mobile. Together, these companies possessed 92% of the total share of the U.S. market as of July 2012. Table 15 (below) shows the U.S. wireless mobile market had a Herfindahl-Hirschmann Index (HHI) weighted average score of 2,873 at the end of 2011, which is considered "highly concentrated" by the federal agencies that use the HHI.[93] The concentration of the market is a direct result of mergers and acquisitions by and between these four large companies with smaller regional providers.

TABLE 14

Estimated Facilities Based Service Provider Share of Service Revenues, 2008 - 2012 (percent)

Company	2008	2009	2010	2011	2012 Q1/Q2
Verizon Wireless	27.8	33.4	33.7	33.8	34.3
AT&T	28.9	31.2	32.4	32.4	32.3
Massachus Sprint Nextel etts	18.6	16.6	15.7	15.6	15.8
T-Mobile	12.6	12.1	11.3	10.5	9.7
MetroPCS	1.6	2	2.2	2.5	2.6
U.S. Cellular	2.2	2.2	2.1	2,2	2.3
Leap Wireless	1.2	1.4	1.5	1.6	1.7
Other	7.2	1.1	1	1.4	1.4

Source: FCC, *Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless Including Commercial Mobile Service* (16th Report), March 2012.

TABLE 15

Mobile Wireless Market Concentration: Herfindahl - Hirschmann Index, 2006 - 2011

Year	2006	2007	2008	2009	2010	2011
High	6,551	6,272	6,801	6,572	6,512	7,178
Average	2,674	2,674	2,842	2,811	2,868	2,873
Low	1,609	1,795	2,123	1,903	1,878	2,088

Source: FCC, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless Including Commercial Mobile Service (16th Report), March 2012.

93. The Herfindahl – Hirschmann Index (HHI) is a calculation used to measure the competitiveness of a given market. The HHI is calculated by summing the squares of the individual firms' market shares. The HHI ranges from less than 1 (atomistic market) to 10,000 (pure monopoly). The FTC and Justice Department consider any market with a score of 2500 or greater to be "highly concentrated." See *FCC Wireless Monitoring Report, March 2013*.

Mobile Radio Service Retail Rates

Commercial mobile radio service (CMRS) is subject to a regulatory framework that differs from traditional wireline service, despite the technological similarities. The *Telecommunications Act of 1996* preempts states from regulating the rates of CMRS services, although states do retain regulatory authority over "other terms and conditions." The FCC has taken a policy position against strict regulation of CMRS, and instead, favoring rates that result from competition. Whereas traditional phone service rates vary from region to region, the four major CMRS providers own and operate nationwide networks, and their pricing is generally consistent across the country. Table 16 (on pg. 61) shows the advertised nationwide rates for the four nationwide providers.

All national carriers, and most regional carriers, offer pre-paid plans that offer consumers the flexibility of paying by minute for service in advance of using the service. These plans do not require service contracts or a set monthly fee. Consumers also have the option of purchasing plans from resellers of CMRS service, and their rates may vary from those advertised in the table above.

Consumer Protection

The Department's Consumer Affairs & Public Information (CAPI) Division helps consumers reach informal resolutions to complaints against regulated utilities; advocates for policies that protect consumer interests; and educates consumers about utility issues. As part of its work, CAPI maintains complaint related data. Tables 17 (on pg. 61) and 18 (on pg. 62) show complaints related to telephone and cable service. These numbers reflect "escalated" complaints—that is any complaint that has been screened and verified by CAPI as a legitimate dispute between a company and a consumer.

The companies with the largest customer base and service territories tend to have the most complaints, and the data show that the Telephone Company of Vermont (FairPoint) and Comcast each received the majority of the complaints for their respective industries. However, Fairpoint's complaint numbers show a significant decrease in complaints over the last three years, from 930 complaints in 2009 to 226 in 2012. Comcast also saw an appreciable decrease in complaints with only 48 in 2011.

TABLE 16

Rates and Plans of Nationwide Facilities Based Carriers

Service Provider	Plan	Rate
AT&T	2 year agreement; unlimited text and voice; 1GB data limit	$35 per month (price includes one phone on plan)
Sprint	2 year agreement; unlimited text and voice; 1 GB data limit	$55 per month (includes one device on Plan
T-Mobile	No annual service contract; unlimited text and voice; 1 GB data limit	$50 per month
Verizon	2 year agreement; unlimited text and voice; 1GB data limit	$60 per month

All plans are nationwide advertised rates. Rates were retrieved from service providers' websites on April 11, 2014. Rates do not include taxes, universal service charge fees or cost of device. Activation and other fees and charges may apply. Plans may not be available in all areas.

TABLE 17

Cable Complaints 2006- 2012

Cable Television Service	2006	2007	2008	2009	2010	2011	2012
Adelphia[1]	34	2	0	0	0	0	0
Charter	8	4	17	3	8	16	7
Comcast	70	126	99	56	122	91	48
North Country[2]	0	1	0	0	0	0	0
Northern Valley[3]	0	4	0	0	0	0	0
Transvideo	0	0	0	0	1	0	0
Opticable	0	0	0	0	0	0	0
Burlington Telecom	0	0	1	1	1	0	0
Duncan	0	0	1	1	1	0	0
Stowe Cable	0	0	1	0	1	0	0
Southern VT	0	0	0	0	1	1	0
Waitsfield Telecom	0	0	0	0	1	0	0
Total	112	137	119	61	136	108	55

1. Comcast purchased Adelphia in November 2006
2. Comcast purchased North Country in 2009
3. Still has CPG, but no customers

Source: Vermont Department of Public Service, Consumer Affairs and Pubic Information Division

TABLE 18

Telephone Consumer Complaints: 2006-2012

Incumbent Local Exchange Carriers	2006	2007	2008	2009	2010	2011	2012
TOC of VT (Fairpoint Northern New England)[1]	245	169	218	930	636	348	266
Fairpoint of VT (formerly Northland)	15	13	8	4	8	14	1
Franklin Telephone	0	0	0	0	0	0	0
Shoreham Telephone	0	0	1	0	0	1	1
TDS Ludlow Telephone	0	1	0	2	0	0	0
TDS Northfield Telephone	0	1	0	0	0	0	0
TDS Perkinsville Telephone	0	0	2	0	0	0	0
Topsham Telephone	0	0	0	0	0	2	0
VTel	7	0	7	0	3	7	2
Waitsfield & Champlain Valley Telecom	2	0	1	3	3	2	3
Competetive Local Exchange Carriers	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
AT&T	N/A	N/A	N/A	N/A	N/A	7	1
BCN Telecom	1	1	3	2	1	0	0
Burlington Telecom	1	1	0	0	1	0	0
Excel/Matrix Telecom	3	3	3	0	0	0	0
Level 3	0	0	5	0	2	4	0
Lightship	2	0	2	0	0	0	0
Metropolitan Telecommunications (Mettel)	1	0	0	1	11	0	0
One Communications[2]	0	3	8	6	10	6	0
OneStar Long Distance	0	0	0	0	1	0	0
SoVerNet Communications	1	4	3	9	10	4	0
Telcove of Vermont, Inc.	0	0	1	0	0	0	0
Verizon Business (formerly MCI)	50	10	10	6	0	4	0
Toll Companies[3]	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
AT&T	9	7	13	7	13	0	0
Excel/Matrix Telecom	0	3	1	1	0	3	1
LDCB	0	0	0	0	0	0	0
MCI	10	0	3	1	2	0	1
NSBI	N/A	N/A	N/A	N/A	N/A	1	0
Pioneer	N/A	N/A	N/A	N/A	N/A	1	0
OneStar	0	0	1	0	0	0	0
Sprint	0	0	0	0	1	0	0
Verizon	8	0	0	1	1	0	0
VOIP Providers[3]	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Comcast	0	2	5	8	16	28	12
Charter	0	0	0	0	0	2	2
Vonage	0	1	0	0	0	0	0

1. Formerly Verizon
2. One Communications was formed by the mergers and acquisitions of the Conversent, CTC and Choice One Communications companies.
3. Access line information not available for toll companies and VOIP providers.

Source: Vermont Department of Public Service, Consumer Affairs and Pubic Information Division; Annual Reports

CHAPTER 3

Vermont State Government Telecommunications Plan[94]

As we become more and more reliant on the use of Information Technology, the State of Vermont must establish a telecommunications plan to ensure operations are not only enhanced, but also reliable, sustainable, and available for use. This telecommunications plan is designed to anticipate the needs of the State for the next ten years. The State must procure and incorporate technologies that will optimize the telecommunications infrastructure. This will create a platform that will enable the use of applications needed to support public services and include emergency responders. In order for the State to remain innovative in its approach to telecommunications services, it must anticipate the needs of agencies and departments by designing and engineering an infrastructure that is flexible enough to handle any future technology. This plan describes the ongoing optimization project that was started in fiscal year 2011. It also describes the current and future direction of the State's data and voice components, along with a strategic plan to move the State forward as new technologies become available.

In 2009, the Agency of Administration completed an Information Technology Optimization Project (I-TOP) assessment that led to a consolidation effort of information technology across state government.

Optimization

In the year 2003, the State of Vermont saw significant positive movement toward the effective management of telecommunications within state government. With the creation of the Department of Information and Innovation (DII), the State took initial steps towards an enter-prise-wide approach by transitioning to a more centralized management concept. While the first stage of reorganization and integration took hold, it was appropriate to look at other ways to integrate state government telecommunications even further. In 2009, the Agency of Administration completed an Information Technology Optimization Project (I-TOP) assessment that led to a consolidation effort of information technology across state government. This consolidation led to cost savings, leveraging of existing and future vendor contracts, and centralized management of state government resources. In FY11, I-TOP was initiated and as of 2014, the telecommunication consolidation project is approximately 70% complete. Expected completion of the I-TOP initiative is 2016.

POLICIES

- In budgeting for and funding state communications systems, facilities and services used for law enforcement, emergency response, emergency management, and public health threat response are considered high priorities.

94. The Vermont State Government Telecommunications Plan was prepared by the Department of Information and Innovation (DII). The Department of Public Service would like to thank the DII staff for their contribution of time, effort, and expertise to this Plan.

- When examining its options for providing voice and data services to state government agencies, DII will examine both state-operated networks and facilities. DII is responsible for managing the communications services provided and costs incurred across the entire state government enterprise.

STRATEGIES

- All state agencies and departments must consult with DII on planning and implementation of all major telecommunications projects, initiatives, and interagency service arrangements to ensure that these plans are consistent with state government enterprise-wide telecommunications policies and objectives.

Data Communications

Every three to five years, the State puts out to bid major telecommunications contracts for data services. Information technology changes rapidly during this intervening period. Services available have evolved, prevailing prices have changed, and a major upgrade to the network backbone of the State's telecommunications infrastructure was completed. The renewal of the state contracts for data communications services in the spring of 2014 represented an important opportunity to address these changes. The State maintains data contracts with multiple vendors to ensure the State avoids dependency for data services on a single vendor. It also gives the State an opportunity to leverage its power as a customer for the public interest, by bringing in high speed connectivity into rural locations and demanding higher quality service from those vendors that also support the private sector.

3-5 YEARS

Every three to five years, the State puts out to bid major telecommunications contracts for data services.

POLICIES

- Except for those instances when there are overriding issues of public safety or security, state government should favor the use or creation of open networks above networks that only state government or elements of the public sector are allowed to use.
- The State must structure a request for proposals (RFP) for data communications connectivity to explicitly enable smaller vendors the opportunity to bid for a fraction of the state's data connectivity needs, or the state's needs in a particular region.
- The State must try to use its purchasing power and excess capacity on state-owned networks to promote improvements in telecommunications infrastructure, services, and prices, especially in unserved or underserved areas of the state.
- The State should seek to engage the purchasing managers at other telecommunications service providers on an ongoing basis. This should include entities such as colleges, schools, major businesses, and hospitals and health care networks. With these partners, State should seek to identify opportunities to coordinate purchases of telecommunications services for mutual benefit or to help improve telecommunications in the wider community.

STRATEGIES

- The State must make open space located in strategically placed state buildings available to telecommunications service providers, if doing so will enable telecommunications vendors serving the State a better or less costly data telecommunications services to unserved or underserved communities.
- The State must issue a request for information (RFI) and an RFP (if warranted) for broadband service contracts to residence for state agencies and departments supporting telecommuting employees.

Voice Communications

The day is quickly approaching when the State will fully utilize a voice telephone system that rides over a data network.

As of 2014, the State still relies upon Centrex technology for voice communications throughout state government. However, the day is quickly approaching when the State will fully utilize a voice telephone system that rides over a data network. The State is poised to see significant costs savings and improved telecommunications service through operating a single voice and data network infrastructure, instead of providing separate voice and data services. The State currently supports 13 call centers utilizing Voice over Internet Protocol (VoIP). These call centers support 340 employees over multiple agencies and departments; such as Department of Tax, Department of Motor Vehicles, and several Agency of Human Services departments. Although a small cost savings has occurred through these VoIP services, it demonstrates the State is ready to implement this on a much larger scale in the coming years.

POLICIES

- The State must continue to review new voice technologies as they mature and standards become firm.
- The State must continue to maintain a voice communications system that provides relatively low cost at high value to state government.
- The State should seek to balance lowest cost with features that enhance the productivity of state workers and improve service to the public, not allowing either one to become a concern to the exclusion of the other.
- The State must seek to establish a long-term technology migration path, while allowing enough flexibility to adjust to technology developments.

STRATEGIES

- The State must seek out telephone services that, when required, can be integrated with and complement other communications-related applications.
- The State must plan for an eventual migration to VoIP services, contingent on cost and value factors. It must establish a migration path over the next two to five years. It must take steps now as opportunities present themselves to facilitate a smooth migration.
- When selecting a voice service provider, the State must evaluate the costs of operating separate voice and data services/networks vs. the costs of operating a converged voice and data network.

- When selecting a telephone service supplier or suppliers, the State must evaluate options for both buying services (e.g. Centrex, VoIP) and operating equipment (e.g. standard or Power over Ethernet switches) and include in the evaluation the long-term costs of each option.

Strategic Plan

A strategic plan is necessary to help focus the State on future development and innovation of the State's telecommunication infrastructure. The design of this strategic plan was aided through the use of other state telecommunication plans, such as California's; however, the scoped of this plan was designed to meet needs of State of Vermont.[95] The strategic plan emphasizes the need to continue with the move towards enterprise-wide management. It also addresses the need for a more robust and flexible telecommunications infrastructure. An emphasis is placed on public safety and emergency preparedness, along with the protection of all information assets. Finally, the strategic plan addresses the importance and need to integrate the State's telecommunications services.

Enterprise Approach

The State will utilize an enterprise approach towards management of telecommunications services. The State will accomplish this through acquisitions, management, and maintenance of enterprise-wide services that are necessary to support any current and all future State government operations. In order to do this, the State must raise its level of telecommunications services to match its business needs. This must be identified during the planning, designing and implementation phases to ensure telecommunications systems are dynamic enough to support all State business requirements.

To effectively implement this, the State should:

- Periodically inventory existing telecommunications services.
- Identify telecommunications services required by State agencies and departments.
- Evaluate existing telecommunications services to determine if they meet the needs of the customer.

There are two critical components in the acquisitions process of telecommunications services:

1. procurement and
2. cost management.

The State should only pursue additional enterprise-wide procurements that are timely and cost-effective. This can most effectively be achieved through leveraging of existing/future telecommunication contract vehicles. However, this is only affective if contracts are centrally managed. Actual savings can occur through central management of state-wide contracts; as

95. See *California Statewide Telecommunications Strategic Plan: Pathways to a Connected California*, Information Technology Council (2007).

opposed to allowing individual agencies and departments the ability to manage telecommunication contracts within their organizations.

To effectively implement this, the State should:

- Develop an easy-to-use procurement vehicle for:
  1. independent network service management and operational services;
  2. streaming video and audio services; and
  3. enhanced and extended data and/or voice services.

In addition to centralizing the procurement process, the State should reduce complexity in telecommunications cost management. Previously, agencies and departments were responsible for managing their own bills for telecommunications services. This method incurred a substantial hidden cost of reconciling, reviewing, and approving invoices from telecommunication service providers. Efficiencies and cost savings will be realized through the continuous efforts to centralize and simplify telecommunication services cost management, where possible.

To effectively implement this, the State should:

- Explore and recommend billing simplification options with telecommunication providers.
- Identify billing simplification options for other telecommunications costs.

Robust and Flexible

The State will procure robust and flexible telecommunications services in support of its business objectives. The State must remain innovative and forward thinking in its development and engineering of the telecommunications infrastructure.

To achieve this goal, the State should:

1. develop a more diverse network infrastructure and
2. engineer the network infrastructure to support a wide variety of applications.

Development of a more diverse network infrastructure gives the State flexibility in choosing locations where agencies and departments can conduct government business. This diversity also gives the State the unique ability to choose how business processes are conducted by being able to procure higher bandwidth options, along with network redundancy at critical locations.

To effectively implement this, the State should:

- Engineer appropriate wireless deployment models for use by state agencies and departments.
- Explore alternatives for shared high-speed communications services to support functions that include general backup, disaster recovery, and fault tolerance for multiple sites/organizations.

The ability to enhance the State telecommunications infrastructure, as bandwidth requirements keep increasing, is a critical aspect of creating a robust and flexible network. The State agencies and departments administer many types of applications that rely on a considerable amount of network bandwidth. Modernizing an infrastructure that can quickly adapt to these unique requirements will enable greater types of usage, along with meeting business needs.

To enable this to happen, the State should:

- Ensure advanced network features (e.g., Quality of Service (QOS) and multi-casting) are built in to the network data flow.
- Implement and manage multimedia services to facilitate public access to government information and services, along with information exchange between government organizations.

Public Safety and Emergency Preparedness

The State has a responsibility to facilitate public safety and emergency preparedness. This will be accomplished through enhanced access to State managed telecommunications networks and through improved survivability and sustainability of these networks. However, to ensure adequate protection of the public, the State will fulfill its obligations, related to public safety and emergency preparedness, by establishing an improved survivability and disaster recovery plan for the State's critical resources.

To achieve this goal, the State should:

1. assess the readiness, survivability, and flexibility the current telecommunications infrastructure and
2. ensure the ability to recover from catastrophic outages is integrated into the operational plan.

The level of readiness, survivability, and flexibility of the State's telecommunications infrastructure will determine whether it has the capability to withstand any man-made or natural disaster. An assessment of the level of readiness, survivability, and flexibility is critical in identifying single points of failure and unsustainable operations.

To enable this to happen, the State should:

- Direct a risk assessment of the readiness, survivability and flexibility of the State's telecommunications assets in the event of a major regional disaster and develop a proposed action plan for addressing identified deficiencies.
- Conduct a feasibility study of alternatives for survivable and rapidly recoverable communications facilities for critical locations and initiate implementation to minimize and/or eliminate single points of failure.

The ability of the State to recover from a catastrophic outage of telecommunications, power, IT resources, or other key infrastructure is totally dependent upon preparations and prioritization schemes developed prior to any major outage.

To enable this to happen, the State should:

- Ensure rapid recoverability and survivability features of new and existing telecommunication services are considered and used appropriately.
- Develop policies that facilitate prioritization of rapid restoration for the telecommunications infrastructure and any facilities affected by the disruption.
- Generate telecommunications fault tolerance guidelines and standards to be used for new State constructed buildings that address:
  - Diversity of telecommunication pathways and installations.
  - Minimum electrical power requirements needed to survive extended interruptions of utility services.
- Use current and emerging telecommunications technologies to provide information, directions, and status updates to the public during an emergency.
- Provide alternate region-wide emergency telecommunications capabilities for recovery from catastrophic or extended outages.

Protection of Information Assets and Networks

The State has an obligation to protect its information assets and networks from loss, damage, misuse, and misappropriation. To ensure security of critical information assets, the State will take actions to secure its networks from unauthorized intrusion, malware, and other disruptions to the safe conduct of the state's business. State networks will be safeguarded from unnecessary or unauthorized use.

To achieve this goal, the State should:

1. establish policies and procedures for governing telecommunications security and
2. provide tools, services, and standards that enable organization to comply with these policies and procedures.

The establishment of policies and procedures that govern telecommunications security is necessary to create a safe and secure operational environment. It helps educate users and produces a culture of smart business practices. It also sets an expectation of information security that is traditionally governed by State and Federal statutes.

To enable this to happen, the State should:

- Develop statewide policies for:
  - Appropriate use
  - Internet use
  - Malware protection
  - Expectation of privacy
  - Mobile devices
  - Remote access

  - Identity management
  - Authentication
- Manage remote connectivity to the network for:
  - Virtual private networks
  - Remote desktop and client applications
  - Telecommuting
  - Access from publicly accessible computers
  - File sharing
  - Network access control

The State will provide the security tools, services, and standards to all the agencies and departments. This will enable organizations to comply effectively with all security policies and requirements that are implemented.

To enable this to happen, the State should:

- Establish a repository for network security best practices, maintain an inventory of current installed technologies, and provide general information to the user of the State's telecommunications network.
- Assess the need of contracts for security products and service offerings (e.g., intrusion protection systems, firewall implementations, network access control, network vulnerability assessment, etc.).
- Implement a security strategy for wireless deployment.

Integration of Telecommunication Services

The State will promote the integration of voice, data, and video services. The State should move sensibly and deliberately toward unified communications. Unified communications services offer the promise of broader capabilities to better serve the public sector, while significantly reducing operational costs. Converged telecommunications technologies, when compared to traditional "silos" of voice, data, and video, offer efficiencies that must be investigated for possible cost savings and service improvements.

To effectively implement this, the State should:

- Develop a technology plan for state organizations that includes voice, data, and video services.
- Design networks with the capability of supporting integration of voice, data, and video services.
- Draft standards to ensure consideration of opportunities for integration in any new development or major redevelopment projects.

CHAPTER 4

Broadband

Introduction

The State of Vermont is committed to ensuring that Vermonters have the best available high speed Internet access. Specifically, 30 V.S.A. § 202 (c) (10) states that the intent of Vermont's telecommunications planning and policy law is to "support measures designed to ensure that by the end of the year 2024 every E-911 business and residential location in Vermont has infrastructure capable of delivering Internet access with service that has a minimum download speed of 100 Mbps and is symmetrical."[96] This Chapter articulates the priorities of the Department of Public Service in achieving the broadband goals laid out by the General Assembly.

Presently, fiber optic cable to the premises (FTTP) provides the best available opportunity to meet the 2024 goal set by the General Assembly.

Broadband Technologies

Presently, fiber optic cable to the premises (FTTP) provides the best available opportunity to meet the 2024 goal set by the General Assembly. FTTP is capable of providing speeds of up to 1 gigabit per second (Gbps) symmetrical service—far in excess of Vermont's 100/100 Mbps goal. Coaxial cable Internet service is generally deployed to provide 100 Mbps download and 10 Mbps upload.[97] In some instances cable can provide higher upload speeds, but generally speaking coaxial cable cannot provide 100 Mbps symmetrical service at this time.[98] DSL generally provides speeds of at least 4 Mbps download speed and 1 Mbps upload speed to most customers in areas where it is deployed. As with cable, DSL has the potential to meet Vermont's 2024 goal, but the cost effectiveness of this technology is untested in Vermont.[99] It should be noted that some DSL users have speeds of only 768/200 Kbps. Current wireless technology can deliver speeds of up to 1 Gbps, but coverage is not ubiquitous and speeds vary by location. Wireless LTE technology as deployed provides average speeds that do not currently meet Vermont's 2024 goal.[100]

96. "symmetrical" means 100 Mbps download and 100 Mbps upload.
97. Vermont's largest cable providers generally offer service at speeds between 100-150 Mbps download and 10 - 20 Mbps upload. Small cable companies may not offer service at these speeds to all customers. Figures 3 and 4 group this service in the 100/10 tier. CableLabs DOCSIS version 3.1 specification allows up to 24 downstream channels (38 Mbps each, 912 Mbps total) and 4 upstream channels (27 Mbps each, 216 Mbps total).
98. Cable providers generally offer business customers service unavailable to residential customers. Cable providers can, and often do, provide fiber to the premises solutions to many business class customers.
99. VDSL2 technology has the potential to bring speeds of up to 100 Mbps symmetrical. This technology relies on very short loop lengths of less than ¼ mile. AT&T and CenturyLink have deployed this technology in various areas around the United States. To date there are no instances of VDSL2 being deployed in Vermont.
100. This Plan calls for every address to have both a wired and wireless solution. Wireless technology will continue to be an important component of Vermont's broadband strategy.

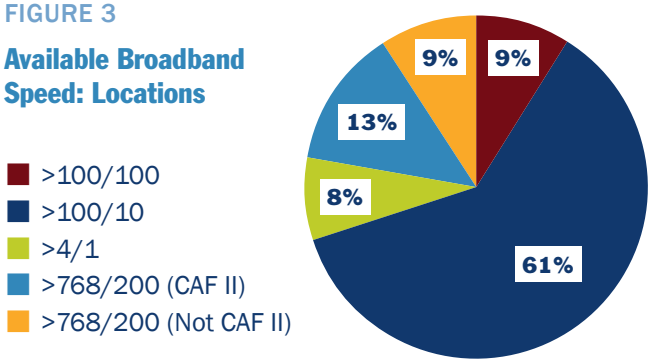
Most consumers think of broadband in terms of what they can do with their connections. Speed is a proxy for functionality. For instance, applications with high bandwidth requirements include telemedicine, and online education programs. These applications usually need a connection capable of high upload speeds. Some residential users may want high upstream data transfer rates for gaming, telecommuting, or peer-to-peer applications. However, the vast majority of residential consumers use their connections to consume media, whether it be streaming music and movies, or browsing the Internet. These types of applications require far less upload bandwidth and considerably more download bandwidth. Some online activities, such as applying for a job, utilizing social media, or accessing a government website, do not necessarily require the highest available speeds. Consumers will choose a level of service that meets their individual needs.

Current Broadband Deployment in Vermont

The State of Vermont has some of the most accurate and informative data on broadband availability in the nation thanks to the use of service data by E-911 location. For purposes of broadband mapping and planning there are approximately 295,000 E-911 business and residential locations within Vermont. Figure 3 shows that 9% of locations (27,574) have or will have service available that meets the 2024 goal.[101] 61% of locations (178,767) have service available that reaches 100 Mbps download and 10 Mbps upload.[102] While this service does not meet the 2024 goal, it comes very close. At 8% of the locations (22,908), the best available service provides access at 4/1 Mbps.[103] 22% of locations (65,816) have or will have high speed Internet access, but the best speeds are below 4/1 Mbps.[104] This plan calls for prioritizing any state funded support by speed, starting with those locations that lack service of 4/1 Mbps or better.

FIGURE 3

Available Broadband Speed: Locations



Source: Broadband Availability Analysis as of 12/31/2013 performed by Stone Environmental on September 23, 2014. Data shows percentage of E911 business and residential locations with access to various speeds of service. The medium blue represents locations eligible for funding from the Connect America Fund Phase II (CAF II) and the orange represents locations not eligible for CAF funding.

Figure 4 depicts the locations in each speed tier by county. The medium blue represents locations eligible for funding from the Connect America Fund Phase II (CAF II) and the orange represents locations not eligible for CAF funding.

As noted previously, the location level broadband availability data is an important component of developing an analysis as to how to best reach the state's goal. Another important factor is the number of road miles that

101. This includes locations served by Burlington Telecom, VTel, Topsham Communications, and ECFiber, even though VTel has not yet completed its build out.

102. Locations in this tier are served by cable providers. Many of these locations may have faster service available.

103. This tier includes locations served by rural LECs and that do not have cable.

104. Figures 3-6 split the 768/200 tier into two groups: locations in the CAF II area and those outside the CAF II area. This will be explained in greater detail throughout this chapter.

FIGURE 4

Broadband Speeds by County: Locations

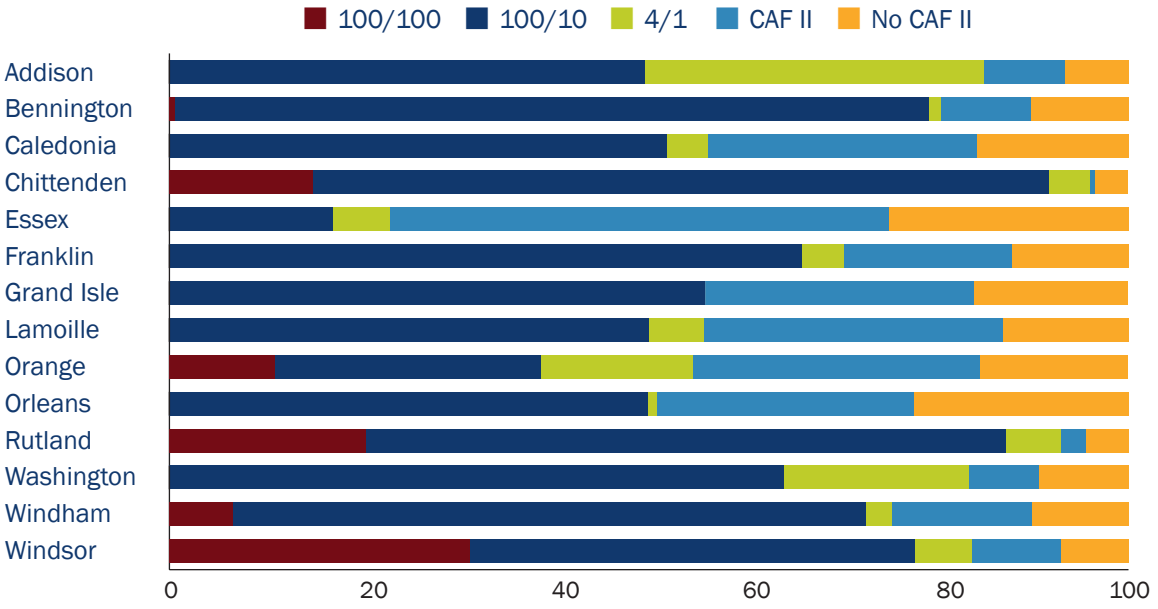
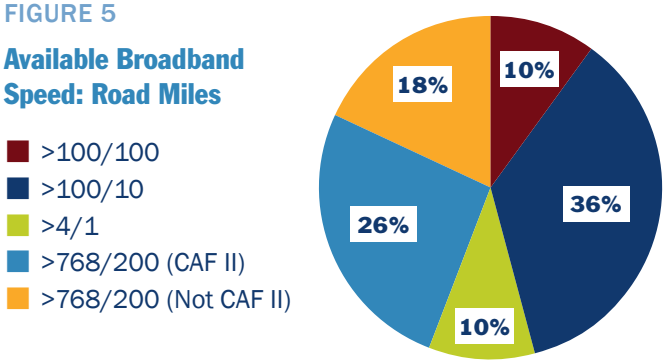


FIGURE 5

Available Broadband Speed: Road Miles



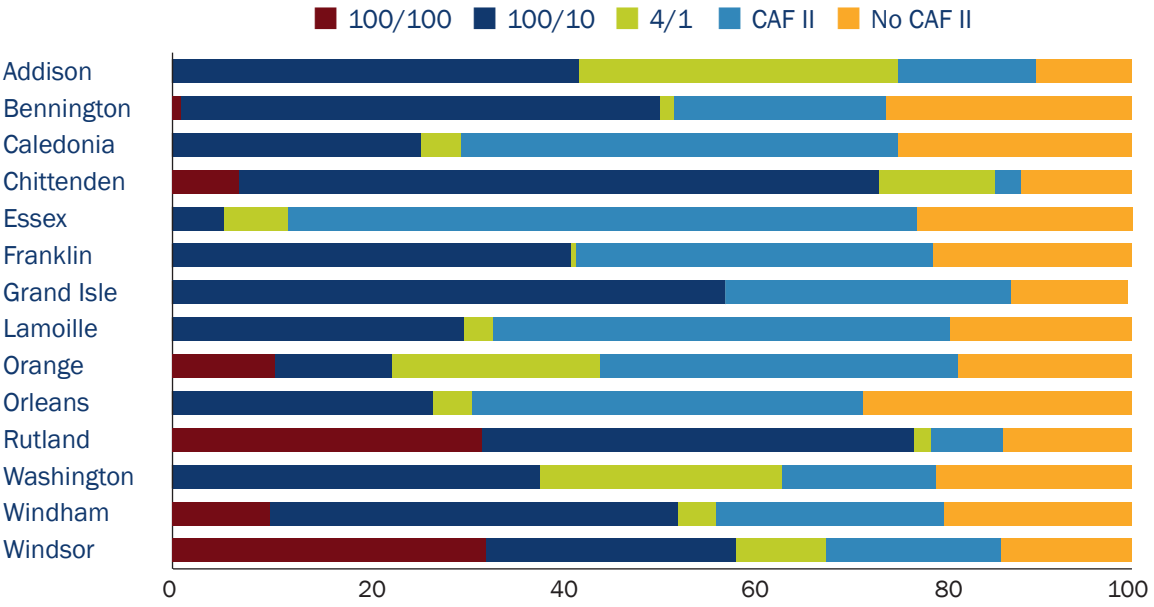
Source: Analysis of 12/31/2014 statewide broadband availability data performed by Stone Environmental on September 23, 2014.

would require fiber installation to reach the locations. This is important because some areas of the state may have 20 locations per mile and others may have 2 locations per mile. In creating an accurate cost estimate it is important to account for both locations and road miles. Figures 5 and 6 illustrate the number of road miles that are in each speed category. Figure 6 (on next page) depicts road miles in each speed tier by county. Counties with higher population densities have a greater ratio of faster speed services. Rural, less densely populated counties have a larger percentage of area not covered by cable and fiber connections. These counties also have a higher percentage of CAF II eligible census blocks.

Figure 6 shows the statewide road miles data from Figure 5 by county.

FIGURE 6

Broadband Speeds by County: Road Miles



Defining the Minimum Acceptable Level of Service

Vermont law directs the Department of Public Service to revise and update the minimum technical service characteristic objectives ("Objectives") for high speed Internet access every three years. The Department defined the minimum Objectives as 4/1 Mbps in the *2011 Telecommunications Plan*. The Objectives have two specific purposes. First, locations lacking service at these speeds will be eligible for state support. Second, grantees accepting state support will be obligated to provide service at these speeds. Raising the Objectives will have two effects. First, raising the Objectives increases the areas that would be eligible for state support. As the Objectives increase, a higher percentage of locations will be underserved. Second, increasing the Objectives increases the costs of building networks that can provide the higher speeds. A larger percentage of addresses will need to be upgraded to meet the higher Objectives. It is important to note that the Objectives set by the Department are a floor. Projects that exceed the Objectives are still eligible for state support and may have a competitive advantage over those that simply meet the standards. Priority for Connectivity Initiative funding will be given to those locations shown in medium blue in Figure 3 that do not currently meet a minimum of 4/1 service, and locations shown in red will be given lowest priority.

This Plan proposes maintaining the current Objectives at 4/1 until 2017, at which point the Objectives will be raised to 10/1. In 2020, the Objectives will then be increased to 100/100 Mbps to reflect Vermont's 2024 goal.[105]

105. The Department will revise the Objectives only when all locations have a solution in place to achieve the current Objectives.

4/1 SERVICE

The Connectivity Initiative requires Priority to be given to projects that serve locations that do not currently meet a minimum of 4/1 service.

The Connectivity Initiative

In 2014 the General Assembly created the Connectivity Initiative. This program directs investment to broadband projects with revenue generated from the Vermont Universal Service Fund. The Department recommends focusing the Connectivity Initiative on those locations that do not presently have 4/1 service or better and which are not eligible for Federal Communications Commission's (FCC) Connect America Support (CAF II). The current FCC proposal under consideration indicates that approximately $50 million in CAF II support will be made available to support eligible areas in Vermont. CAF II will bring 4/1 service to an estimated 12% of E-911 locations starting in early 2015.[106] Act 190 indicates that Vermont seeks to provide each service location in Vermont with access to Internet service that is capable of speeds of at least 4 Mbps download and 1 Mbps upload ("4/1"). The Connectivity Initiative should therefore first target the 10% of addresses that lack service of at least 4/1 and which are not CAF II eligible. By focusing on these areas, the state will be able to leverage federal support to maximize the number of locations meeting the state's initial goal of bringing 4/1 Mbps service to every location.[107]

In addition to the Connectivity Initiative, the State of Vermont will seize other methods of encouraging facilities based investment. Regulatory opportunities will give the state leverage to promote service expansion. Public-private partnerships also remain a top priority for the state. The Department recommends appointing a connectivity development manager to the recently created Division of Connectivity. The development manager would be responsible for matching private interests with public investment opportunities.

Cost Estimates for the 2024 Goal

As stated above, Act 190 sets a goal of 100 Mbps symmetrical by 2024. At this time, fiber to the premises (FTTP) presents the best solution for meeting this goal. The following is an analysis of the cost of building FTTP to every E-911 location presently lacking 100/100 service. These estimates are based on two prior FTTP projects in Vermont: the VTel fiber project and ECFiber. A third model developed by rural carriers in Nebraska is included for reference. The charts below provide a rough estimate of what the cost of deploying FTTP statewide would be.[108] It is important to note that the estimates are not business models and do not include operating expenses. It is important to keep in mind that just like any other technology, costs may come down over time, and new technology options may become available. This Plan assumes that FTTP is, for the time being, the best solution to meet the state's 2024 goal.

106. CAF II will provide support for approximately 30,000 locations that currently lack service of at least 4/1. This number differs from the number identified in this report. This is because the FCC employs household data from the census bureau while this report employs location data from the Vermont E-911 database.
107. 30 V.S.A. § 7515b(a) (as amended by Public Act 190 § 5 (2014 Vt. Bien. Sess.)).
108. The Cost analyses for VTel and ECFiber are based on information provided by each organization and have not been substantiated by the Department.

The VTel Estimate

VTel is a rural ILEC that serves exchanges through southern and central Vermont. In 2011, VTel was awarded a federal grant to bring fiber to the premises to all locations (16,280) within its territory. The grant amount totaled $73.8 million. By calculating the number of road miles (1,403) in VTel's territory, the Department estimates it cost VTel $52,602 dollars per road mile to deploy its FTTP network. It should be noted that at the time of deployment, VTel had an extensive network that included middle mile fiber and inside plant assets.

ECFiber Estimate

ECFiber is a rural CLEC operating in the Upper Valley. ECFiber is held out as "municipal broadband" but is not organized like a traditional municipal entity. ECF Holdings, LLC is a partnership of 24 towns through an inter-local contract. ECF owns and manages the assets of ECFiber and conducts day to day operations. ECF is funded mostly by private investment, through the issuance of tax exempt promissory notes. It has developed its fiber network from the ground up.

ECFiber states that its cost estimate assumes $24,000 per mile, plus $1,000 per location. It generally needs six pre-subscribed locations per mile to commit to a given project. The Department calculated the state-wide cost of deploying fiber by integrating the cost of deploying fiber to all locations with the cost of deploying fiber along every road mile.

The Nebraska Estimate

ILECs in Nebraska funded a study to identify a formula to estimate the cost of deploying fiber to the premises in Nebraska. This study examined over 250 FTTP projects that deployed service throughout entire telephone exchanges in rural areas across the country. The Nebraska estimate calculates fiber deployment at $12,991 per mile, plus $4,430 per location. This represents the high estimate for deploying FTTP statewide in Vermont. However, it should be noted that this estimate presents the most comprehensive analysis, drawing data from 167 FTTP projects around the nation.[109]

Cost Estimates

Figure 7 (next page) shows the estimated cost of deploying FTTP in each speed tier. The total cost of serving all locations that presently do not meet the 2024 goal of 100/100 Mbps service is $662 million under the ECFiber estimate, $866 million under the VTel estimate, and $1.4 billion under the Nebraska model. The Department recommends that any available public funding should be focused on those locations that presently lack 4/1 Mbps service (the 768/200 tiers). The cost of covering those locations is estimated at $259 million under the ECFiber estimate, $423 million under the VTel estimate, and $396 million under the Nebraska model.[110]

109. Stone Environmental participated in the development of the Nebraska cost estimate. The analysis was completed in January of 2011.
110. These are the total cost estimates for extending service to both the CAF II and not CAF II eligible locations.

FIGURE 7

FTP Cost By Speed Tier

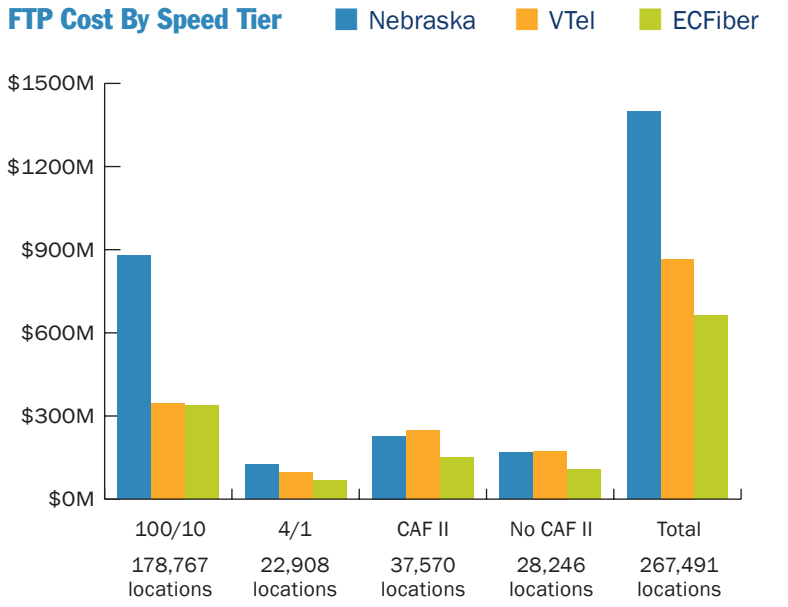


TABLE 19

Cost Estimates

Speed Tier	Locations	Miles	Nebraska	VTel	ECFiber
100/100	27,574	1,719			
100/10	178,767	6,599	$878M	$347M	$337M
4/1	22,908	1,814	$125M	$95M	$66M
768/200 CAF II	37,570	4,727	$228M	$249M	$151M
768/200 No CAF II	28,246	3,314	$168M	$174M	$108M
Total	295,065	18,173	$1,399M	$866M	$662M

This table reflects the same information as Figure 7.

Source: Department of Public Service analysis of the cost of deploying FTTP using three estimates. This figure depicts the cost of deploying FTTP using three cost estimates.

The 768/200 Kbps speed tiers include 65,816 locations. Of these locations 37,570 are eligible for support through CAF II. In order to be eligible for CAF II, locations must be in census blocks where not a single location in the census block has access to broadband service of 4/1 or better. The remaining 28,246 locations are within "partially served" census blocks. These are census blocks that have at least one location that has access to broadband service of 4/1 or better. Even though these 28,246 locations lack access to 4/1, because they are in "partially served" census blocks, they are not eligible for CAF II funding. The Department recommends the 28,246 locations that lack access to service better than 4/1 but that are not eligible for federal support should be the particular focus of the Connectivity Initiative.

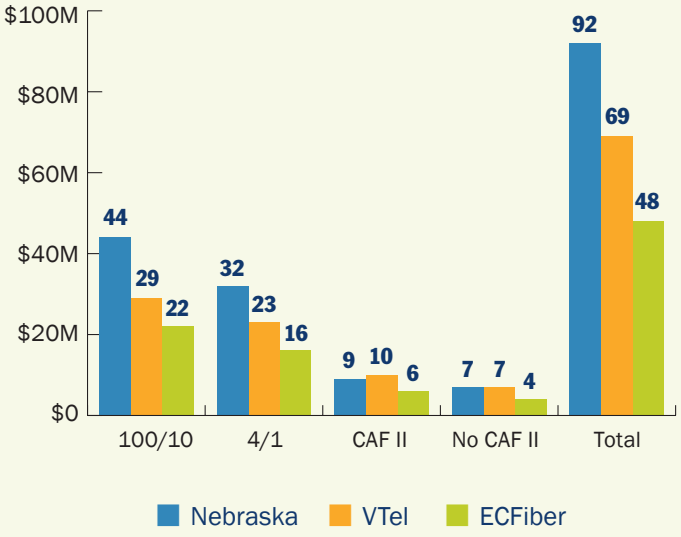
The cost of deploying FTTP to these locations is $108 million under the ECFiber estimate, $174 million under the VTel estimate, and $168 million under the Nebraska Model. It should be noted that the 28,246 locations are scattered throughout the state and are not always grouped together. In fact, these locations are in census blocks that contain 90,828 locations. On average, 69% of the locations and 41% of the roads in these partially served census blocks have access to broadband at 4/1 or better. Serving these locations may require some overbuild of locations in higher speed tiers, which is not calculated in the costs provided above.

Conclusion

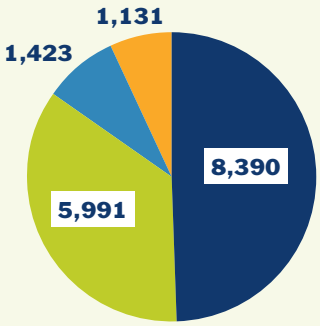
The State of Vermont should consider first targeting funding for broadband deployment projects at locations with the lowest speeds and that are not in a CAF II eligible census block. These locations are the least likely to be served with a connection meeting the 2024 goal by market forces. The pages that follow present a county by county analysis of the number of locations in each speed tier and the cost to serve them with fiber to the premises.

Addison County

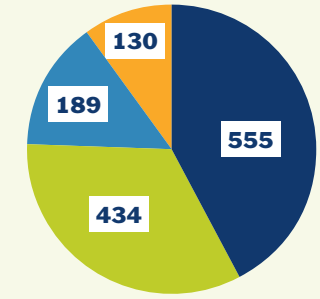
COSTS (in millions)



LOCATIONS:
16,935 total

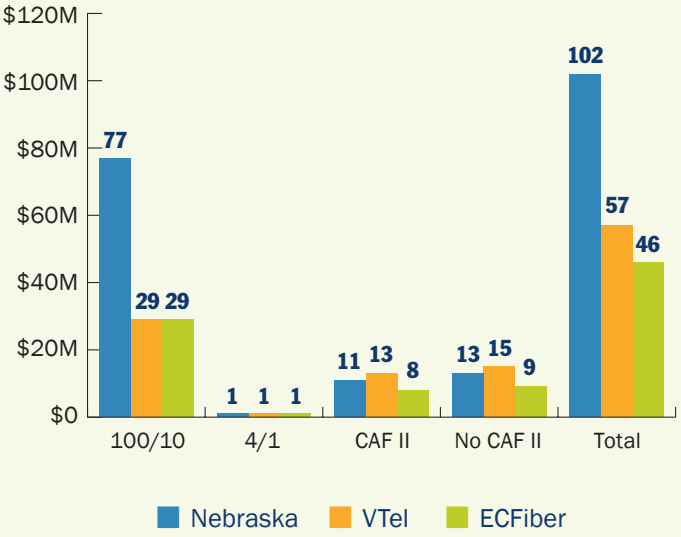


MILES:
1,308 total

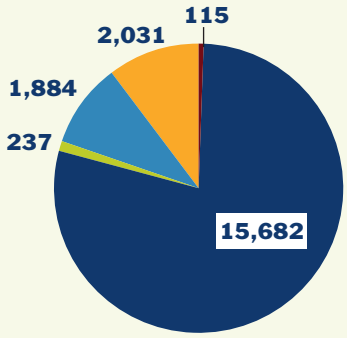


Bennington County

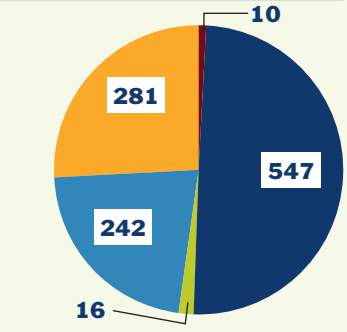
COSTS (in millions)



LOCATIONS:
19,949 total

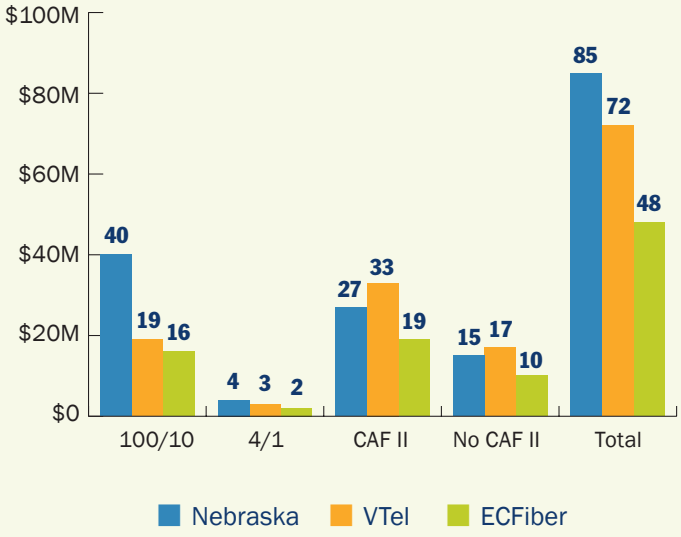


MILES:
1,096 total

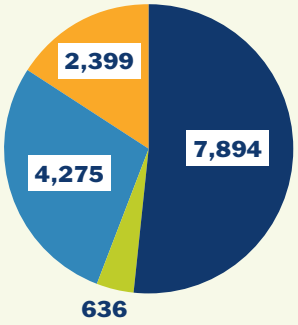


Caledonia County

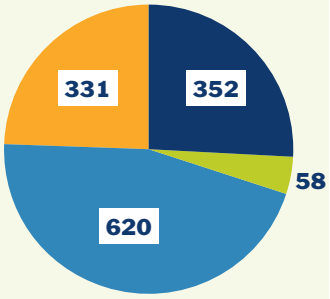
COSTS (in millions)

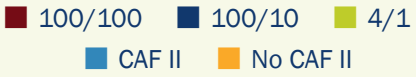


LOCATIONS:
15,204 total



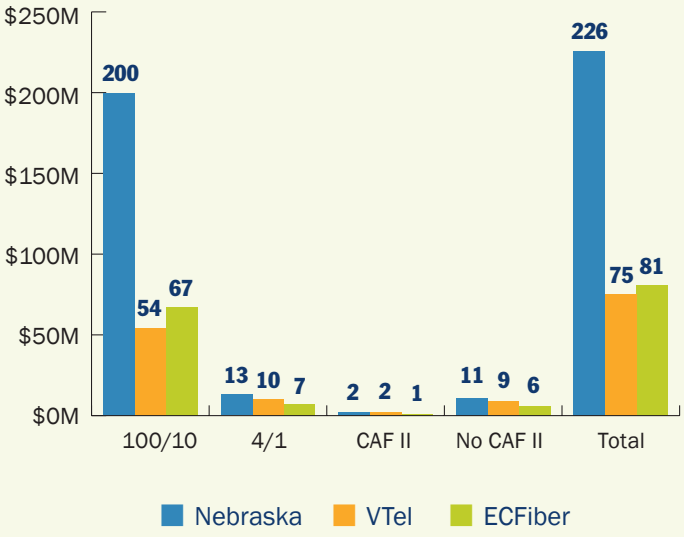
MILES:
1,361 total



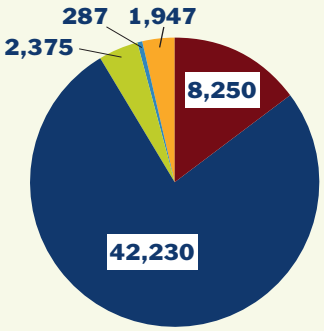


Chittenden County

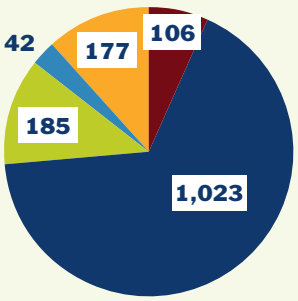
COSTS (in millions)

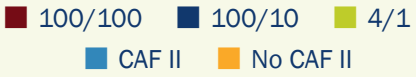


LOCATIONS:
55,089 total



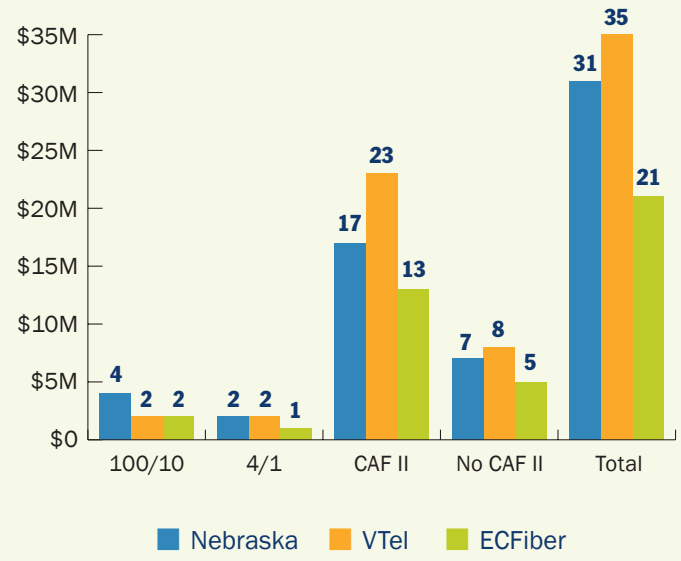
MILES:
1,533 total



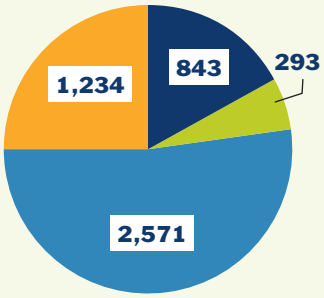


Essex County

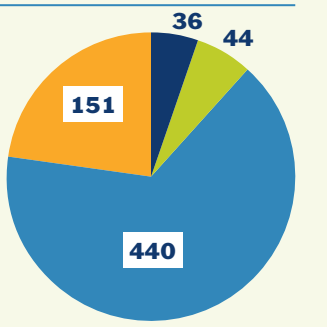
COSTS (in millions)

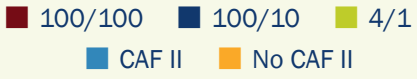


LOCATIONS:
4,941 total



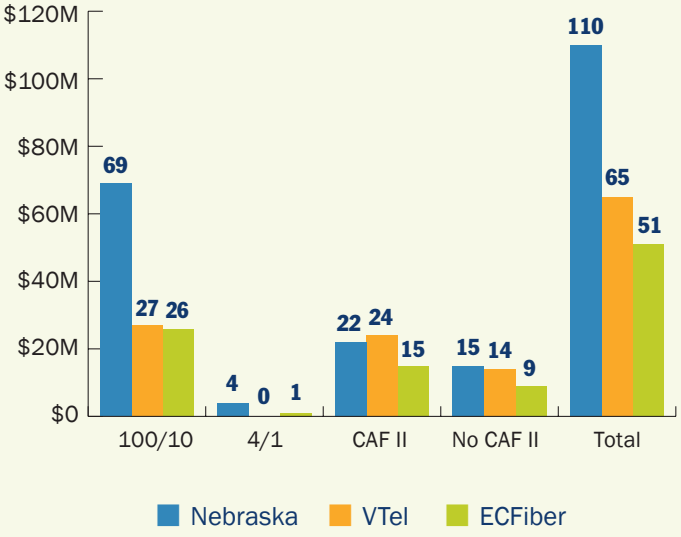
MILES:
670 total



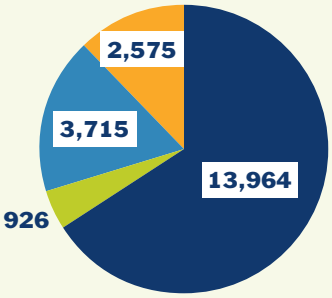


Franklin County

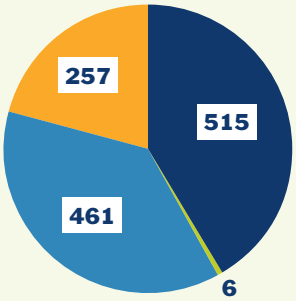
COSTS (in millions)



LOCATIONS:
21,180 total

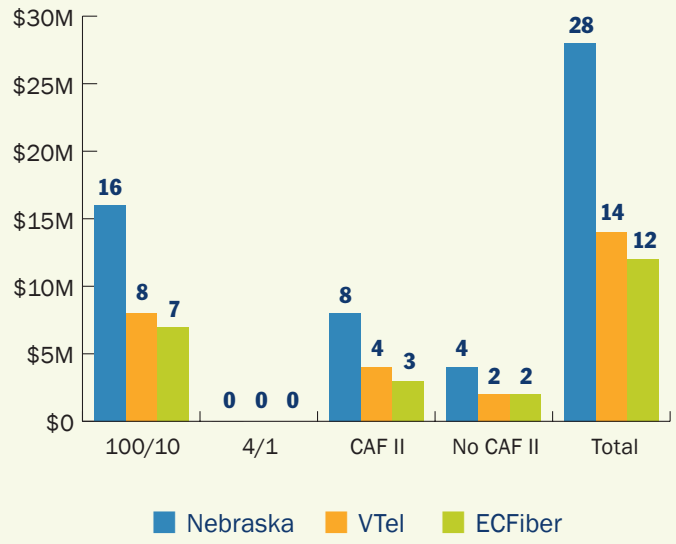


MILES:
1,239 total

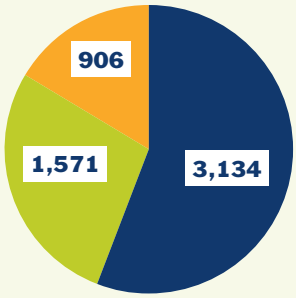


Grand Isle County

COSTS (in millions)



LOCATIONS:
5,611 total



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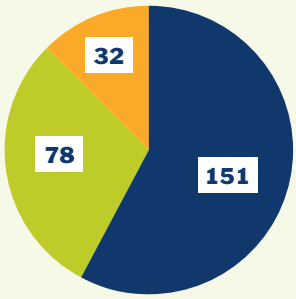
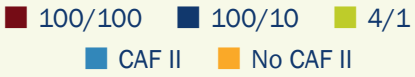
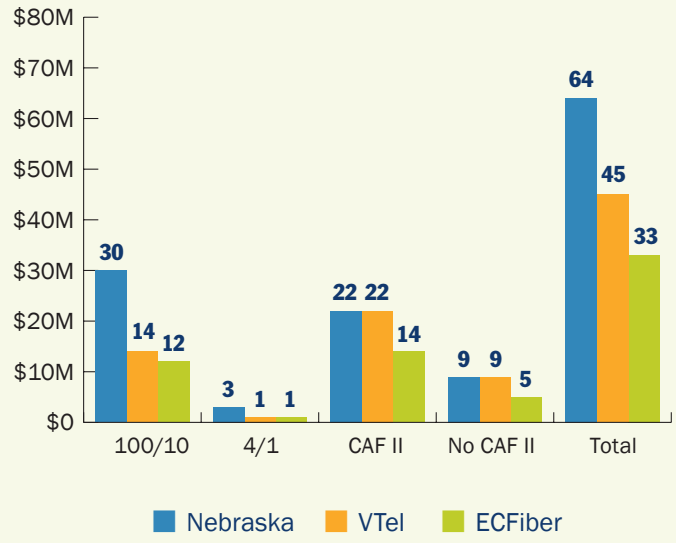




Lamoille County

COSTS (in millions)



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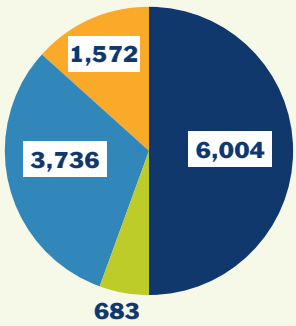

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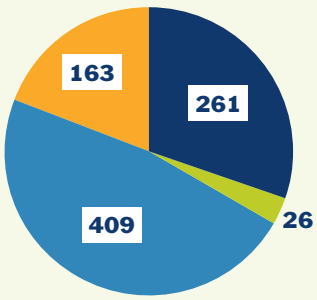
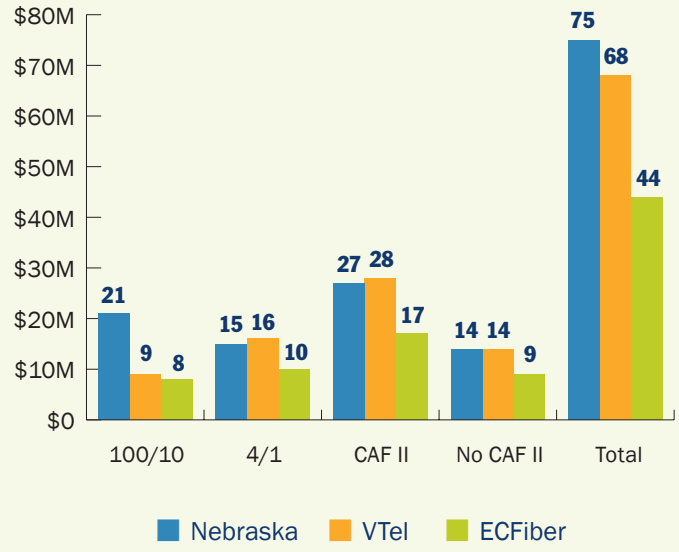


Orange County

COSTS (in millions)



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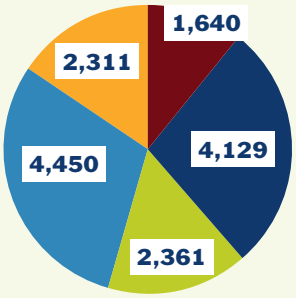

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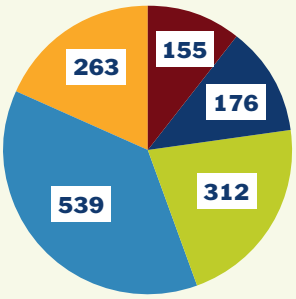
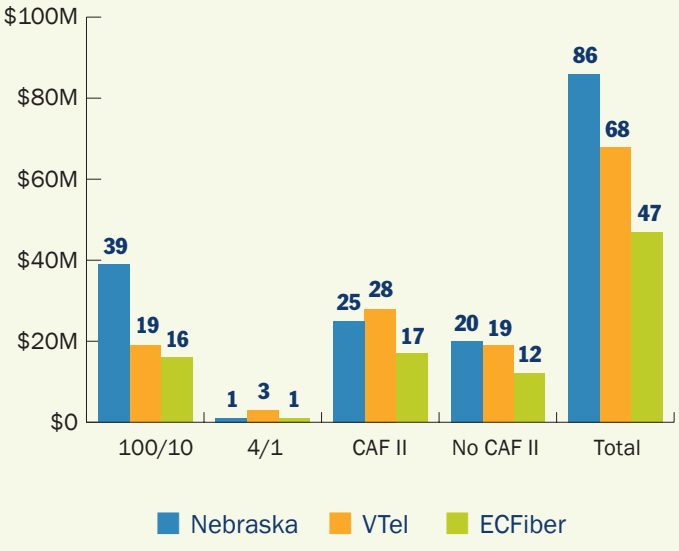


Orleans County

COSTS (in millions)



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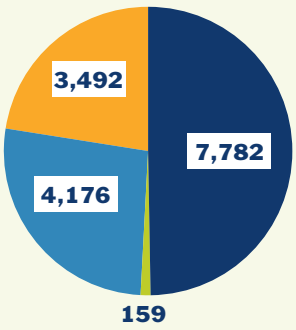

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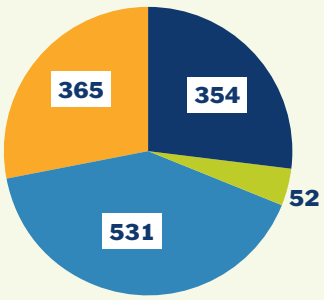
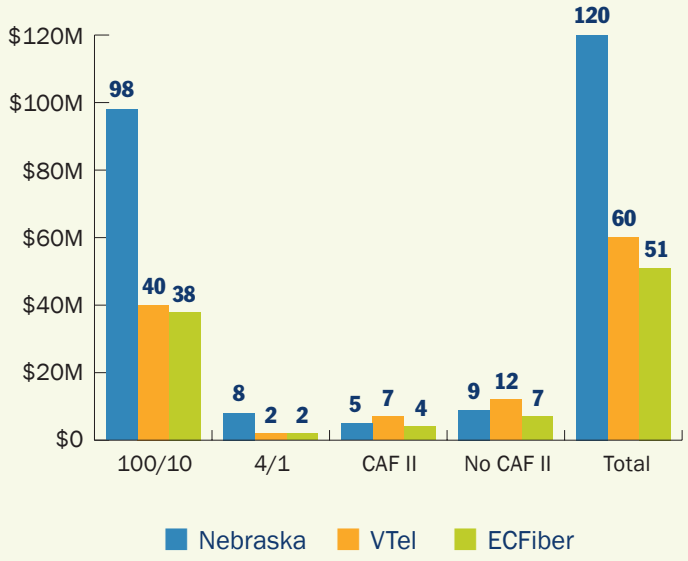


Rutland County

COSTS (in millions)



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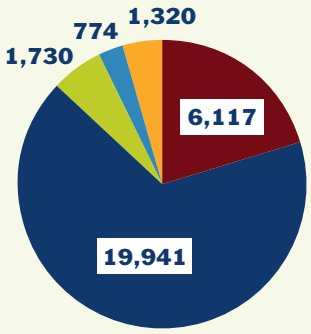

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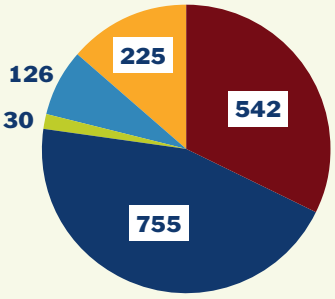
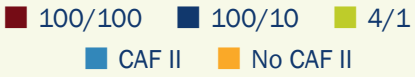
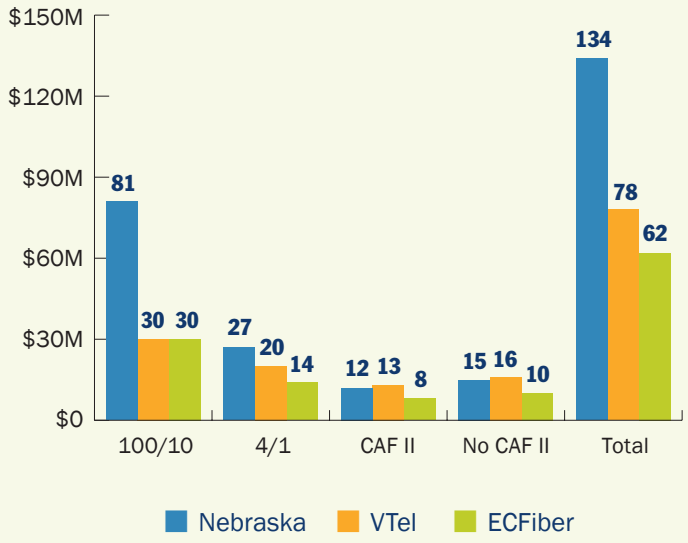




Washington County

COSTS (in millions)



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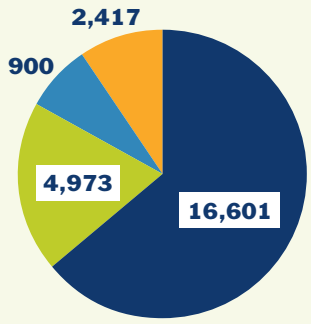

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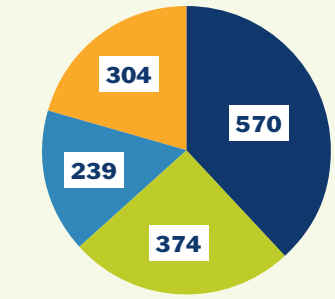
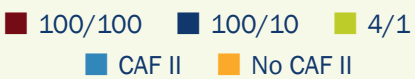
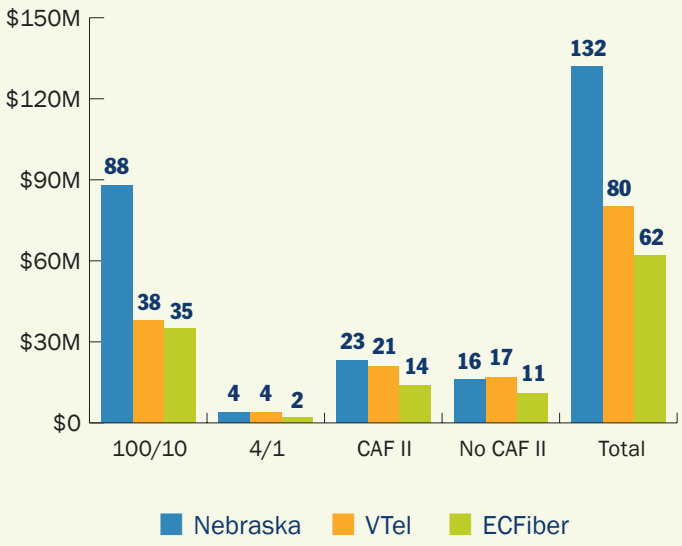




Windham County

COSTS (in millions)



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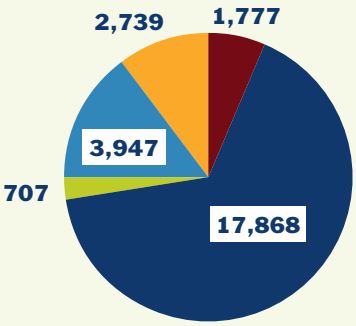

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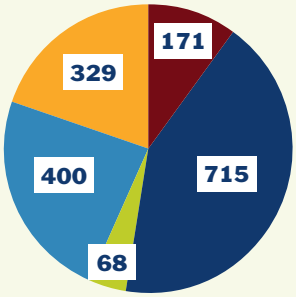
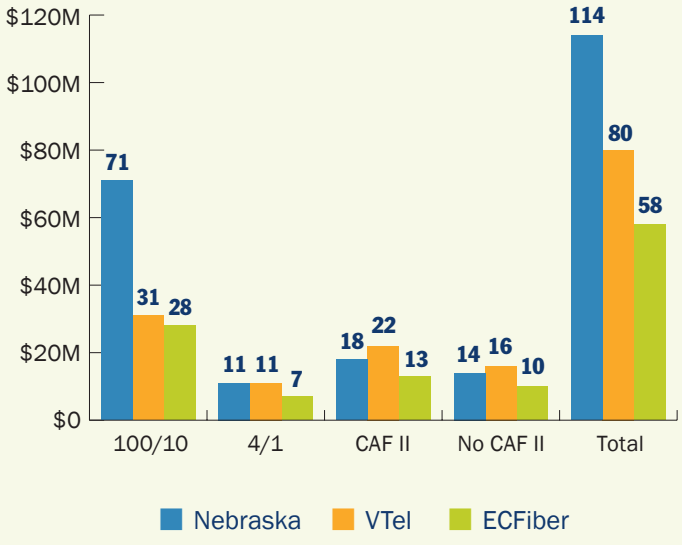


Windsor County

COSTS (in millions)



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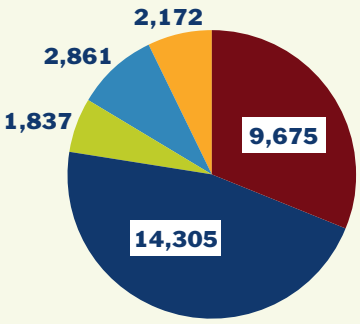

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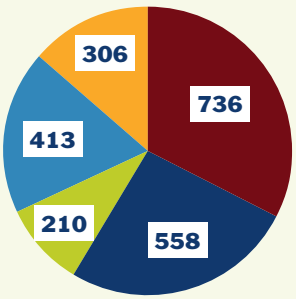


CHAPTER 5

Telecommunications Development Planning and Regulatory Policy

A Vision for Vermont

Connectivity is crucial to economic growth in Vermont, and quality communications services are necessary for Vermont's continued prosperity and success. Ensuring that every Vermonter has access to quality, reliable, and affordable communications services is the primary goal of this *Telecommunications Plan*. This chapter presents readers with a vision for Vermont's telecommunications future. As discussed in other sections of the Plan, the challenges facing Vermont and the nation are complex and dynamic. Uncertainty over federal regulatory policy, cost, and national funding decisions will be factors to consider as we develop and implement solutions. The policies and strategies outlined below provide realistic and attainable solutions to the challenges that lay ahead—solutions that take into account the limits of state action and all the possibilities when the state collaborates with public and private stakeholders. Equally important is understanding the dynamic change in the sector. Specifically, while this Plan lays out a vision for the next ten years, Vermont must remain flexible and nimble to enable us to respond to future changes in the market.

This Plan envisions a Vermont where every Vermonter has affordable access to the Internet using the best technology at every location. The Plan also envisions a Vermont where Vermonters have reliable phone service at affordable rates, and where mobility, reliability, and public safety are highly valued characteristics of every network. This vision supports the belief that in most of Vermont's urban and suburban areas, demand will drive private investment and competition in a way that will maximize consumer choice and benefit.

By 2024, every address should have broadband speeds of 100 Mbps symmetrical.

The following goals, if met, will make this Plan's vision a reality.

1. **Broadband Speed.** Every address[111] in Vermont should have available broadband Internet access with the minimum technical requirements of 4 megabits per second (Mbps) download and 1 Mbps upload. By year end 2020, a majority of addresses in Vermont should have access to the Internet at speeds of at least 100 Mbps symmetrical, and every address should have access at speeds of at least 10 Mbps download. By 2024, every address should have broadband speeds of 100 Mbps symmetrical.
2. **Broadband Deployment.** Every address in Vermont should have access to wired and wireless broadband Internet access service.
3. **Affordability.** Broadband service should be affordable to all members of every customer class.

111. "Address" means E-911 residential and business locations.

4. **Local Public Generated Content.** The state should promote locally generated content that is used and useful to the community.
5. **Adoption and Usage.** Vermont should support the universal adoption and use of broadband service at home and at work.
6. **Mobile Service.** Vermont should have universal availability of mobile service along roadways and near universal availability statewide.
7. **Basic Service.** Vermont should have reliable, economical telephone service in all areas of the state, including rural areas. All residents, regardless of income or location, should have access to basic telephone service.
8. **Enhanced 911.** Vermont should have available the best possible E-911 service. The State should endeavor to find greater efficiencies within the E-911 system without sacrificing public safety.
10. **Competition.** Vermont's telecommunications marketplace should be competitive and all Vermonters should reap the benefits of competition.
11. **Regulatory Fairness.** Like services should be regulated alike, regardless of the platform or technology used to provide the service.

Telecom Infrastructure and Service Development

Infrastructure Financing and Service Development

Vermont received an unprecedented amount of funding for broadband infrastructure projects as a result of the America Recovery and Reinvestment Act. It is unlikely that Vermont will have an opportunity of this magnitude in the foreseeable future. There are, however, several initiatives directing investments in advanced telecommunications networks going forward. The two major sources of investment funding that Vermont providers will utilize are the Connect America Fund and the Vermont Universal Service Fund. Each program is discussed in turn.

Connect America Fund

The Connect America Fund (CAF II) is poised to bring millions of dollars to the state to improve Vermont's broadband capable networks. In areas deemed eligible for support, the FCC will give Vermont's successor Regional Bell Operating Company (RBOC), FairPoint, the opportunity to bring broadband Internet at 4/1 access (or higher as amended by the FCC) to designated areas. If FairPoint accepts this funding, it will be required to make a commitment to serve the designated areas. In the event that FairPoint chooses not to accept support, funding will be awarded to other providers through a competitive bidding process.

STRATEGY

- In the event that Vermont's successor RBOC chooses not to accept CAF II support, Vermont should provide technical assistance to other Vermont companies in the FCC's reverse auction.

Vermont Universal Service

There are two programs funded by the VUSF that are focused on broadband infrastructure development. The first program provides high cost support to any provider that commits to serving a designated high cost area. To receive support, a provider must petition the Public Service Board to become a Vermont Eligible Telecommunications Carrier (VETC). The VETC shall offer voice telephony and broadband to customers at all locations throughout the service area or areas for which it has been designated.[112] It must also meet service quality standards for telephone service. Both the Connectivity Initiative and the High Cost Program will be funded by the Connectivity Fund.

The second program, the Connectivity Initiative, will make support available to Internet access projects with speeds that meet or exceed Vermont's minimum technical service characteristic objectives. State law directs the Department of Public Service to identify and publish a list of census blocks eligible for Connectivity funding. Annually, the Department will solicit proposals from service providers, the VTA, and the Division for Connectivity to deploy broadband to eligible census blocks. By statute, the Department will give priority to the lowest cost bidder but must also consider the following factors:

- proposed data transfer rates and other data transmission characteristics of services that would be available to consumers
- price of service to consumers of services
- proposed costs to consumers of any new construction, equipment installation service, or facility required to obtain service
- economic feasibility of the deployed technology
- the availability of comparable services
- the objectives of this Plan

The goal of the Connectivity Initiative is to bring 100 Mbps symmetrical service to all Vermont locations by 2024. The Connectivity Initiative will give priority to projects that serve locations lacking 4/1 service. The criteria listed above will give the state flexibility in choosing projects that fulfill Vermont's goals.

4/1 SERVICE

The Connectivity Initiative will give priority to projects that serve locations lacking 4/1 service.

POLICIES

- In meeting the 2024 goal of 100 Mbps symmetrical to every E-911 business and residential location in Vermont, priority for service upgrades should be

112. 30 V.S.A. § 7501(b)(7) indicates that the number of service locations in each exchange shall be determined by the Department of Public Service in periodic updates to the State Telecommunications Plan based on analysis of the locations in the database of the Vermont Enhanced-911 Board. The Department identified business and residential locations from the database and prepared a summary of locations in each wire center. The table in Appendix 1 lists, for each Vermont wire center, the number of business and residential locations. It also lists the wire center loop density zone identified in the FairPoint Telephone Operating Company of Vermont Statement of Generally Available Terms, section 5.5.1.2.

given to locations furthest from the 2024 goal, starting with those locations that do not meet the current Objective of 4/1.

- State funding should be focused toward last mile connections.

STRATEGIES

- The Connectivity Initiative should first focus on the locations that lack 4/1 or better service before addressing locations with higher levels of service.
- Vermont should consider requiring all state funded projects not meeting the 2024 goal to have a clear migration path to support ever higher speeds as needed.
- The State of Vermont will develop and employ an inventory of infrastructure that is available, or reasonably likely to be available, to support provision of services to underserved areas.

Defining the Minimum Acceptable Level of Service

Vermont law directed the Department to define the minimum technical service characteristics objectives ("Objectives") that ought to be available as part of broadband services commonly sold to residential and small business users throughout the state.[113] The purpose of that provision was to direct investments by the Vermont Telecommunications Authority (VTA). Although the functions of the VTA are transitioning to the Connectivity Division, the Objectives remain important for two reasons.[114] First, locations lacking access to services that meet the Objectives are eligible for support from the Connectivity Initiative.[115] Second, the Division of Connectivity is directed to promote the expansion of broadband services that offer actual speeds that meet or exceed the Objectives contained in the state's Telecommunications Plan. The requirements for services supported by the Connectivity Initiative are not defined in statute.[116]

The Department defined the Objectives at 4 Mbps download and 1 Mbps upload (4/1) in the *2011 Telecommunications Plan*. In the *Transformation Order*, the FCC specified that all services supported by the Universal Service Fund must provide Internet access with speeds of 4/1.[117] The Department mirrored the state's Objectives on those set by the FCC.

113. 30 VSA § 8077.

114. 2014 Acts and Resolves No. 190, Sec 9 (Amending 30 V.S.A. § 202d to direct the Department to include the Objectives beginning with the 2017 Telecommunications Plan.

115. 30 V.S.A. § 7515b. The Connectivity Initiative was created for the purpose of bringing broadband that is capable of 4 Mbps download and 1 Mbps upload to each service location in Vermont.

116. 30 VSA § 7515b indicates that any new services funded in whole or in part by monies in this Fund shall be capable of being continuously upgraded to reflect the best available, most economically feasible service capabilities.

117. The FCC indicated that some percentage (to be defined later) would need to support 6 Mbps download speed and 1.5 Mbps upload speed. The FCC has yet to define the percentage that would need to meet these speeds. However, in FNPRM 14-54, issued June 10, 2014, the FCC sought comment on a proposal to increase the benchmark prospectively to a download speed of 10 Mbps and some upload speed greater than 1 Mbps. (http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0626/FCC-14-54A1.pdf) paragraph 138.

...measures designed to ensure that every business and residential location in Vermont has infrastructure capable of delivering Internet access with service that has a minimum download speed of 100 Mbps and is symmetrical.

Act 190 provides important direction to guide the formation of the Objectives. The short term goal is found in 30 V.S.A. § 7515b, which states that it is the purpose of the Connectivity Initiative to provide each service location in Vermont access to Internet service that is capable of speeds of at least 4 Mbps download and 1 Mbps upload. The long term goal is found in 30 V.S.A. § 202c (10) which states that the purpose of the state's telecommunications policy and planning statutes is to "support . . . measures designed to ensure that every business and residential location in Vermont has infrastructure capable of delivering Internet access with service that has a minimum download speed of 100 Mbps and is symmetrical."

The FCC CAF II program will provide funding to bring 4/1 service to completely underserved census blocks. The program, expected to be launched in early 2015, will allow grantees up to 5 years to bring service to supported locations. The Department believes that state goals should be in line with, and take advantage of, federal funding sources. Therefore the Department believes it is reasonable to expect that the ubiquitous 4/1 availability goal should be met by 2020. As an intermediate goal, the Department believes that a majority of locations should have access to 100 Mbps symmetrical service by 2020. Ubiquitous availability of 100 Mbps symmetrical service by 2024 remains the long term goal.

To support attaining these goals, the Department believes that the Objectives should be set as follows. The Objectives should remain at the 4/1 level they were set at in 2011 through the end of 2017. The Objectives should be set at 10/1 in the 2017 Telecommunications Plan. The Objectives should be set at 100/100 in the 2020 Telecommunications Plan.[118]

YEAR OBJECTIVES

2014	**4/1**
2017	**10/1**
2020	**100/100**

It is important to note that the Objectives set by the Department are a floor. Projects that exceed the Objectives are still eligible for state support and may have a competitive advantage over those that simply meet the Objectives. The Connectivity Initiative can be used to "leap frog" underserved areas to the state's ultimate speed Objective.

POLICY

The State of Vermont should establish objectives that reflect the minimum acceptable level of service. The Department of Public Service should periodically review currently deployed services and commitments to provide service to ensure that the Objectives are in line with national and state trends in communications technology and investment.

118. The Objectives will remain at the previous level until commitments are in place to bring that level to all locations throughout the state.

Broadband and Mobile Wireless Mapping

In 2010, the National Telecommunications and Information Administration (NTIA) awarded Vermont a $3.5 million grant to conduct its broadband mapping initiative. The grant provided funding for three years to the Vermont Center for Geographic Information (VCGI) in partnership with the Vermont Telecommunications Authority (VTA) and the Department of Public Service. Through this grant, VCGI and its partners started the Broadband Mapping Initiative. The initiative's primary responsibility is the collection and analysis of data on broadband availability.

The NTIA grant ends in January 2015. However, state law provides for continued mapping initiatives. Act 190 directs the Department of Public Service to identify eligible census blocks for funding through the Connectivity Fund. The Act also directs the Department to determine service locations for purposes of high cost fund eligibility. By continuing its mapping effort, Vermont can direct investment where it is most needed.

STRATEGIES

- The State of Vermont will ensure a fluid transition from broadbandvt.org to a new mapping resource site.
- The Department of Public Service will lead the state's mapping effort after October 2014.
- Maps produced by the Department should be publicly available and incorporate the most up to date information available.

Open Access

Open access presents a missed opportunity for the United States. Open Access is the concept that owners of "bottleneck facilities" should be required by the government to open those facilities to competitors on a non-discriminatory basis and at rates that will encourage competition. Such a scheme maximizes efficiency of resources since customers will pay for the investment of one network rather than many redundant networks. Consumers will have greater choice of services at better prices. Many countries in Europe and Asia have embraced open access as a method of increasing choice and reducing price in the retail broadband market, but adoption of such policies in the United States is less common.

"Open Access" was discussed during the public hearing for this Plan and in testimony during the 2014 legislative session. The concept, as raised, appears to center on the state requiring service providers to make their facilities available on a non-discriminatory basis.[119] Supporters of open access believe that the backhaul from remote areas to more urban areas is one of the leading impediments to bringing broadband and mobile services to rural and remote unserved and underserved areas. It was suggested that companies employing public rights of way or accepting public funds should have a requirement to provide "open access" to their networks, and that this would improve broadband and mobile availability. Although a seemingly

119. Testimony of Charlie Larkin, Tr. 2/21/14 at 9-11.

simple concept, it is actually hard to define open access, much less implement it. Is open access a requirement imposed on a service provider to allow other providers to employ the carrier's facilities? Is it more specific, such as a requirement to provide dark fiber strands? Alternatively is it a requirement to provide throughput across a network? And ultimately the issue comes down to cost: how should costs be allocated, and who should do this?

Network operators contend that the primary reason areas remain underserved is that the business model to serve them is challenging. If additional service providers have subsidized access to the network, this will erode the subscription rate of the underlying carrier and further undermine that business model. Even for those supportive of open access, there are legal impediments in the ability of regulators to impose conditions to effectuate the requirement. States have jurisdiction over intrastate telecommunications and information services. However, if states attempt to impose interconnection and non-discrimination requirements on inter-state services, or services that might include inter-state services, service providers may argue that states are preempted from this action.

There are three examples of network sharing approaches to consider that approximate the open access provisions described by proponents. These are the requirements of incumbent local exchange carriers (ILECs) under the *Telecommunications Act*, the requirements imposed on recipients of ARRA-funded grants by the NTIA and RUS, and voluntary open access systems.

ILEC Requirements

Federal law requires ILECs to "provide nondiscriminatory access at any technically feasible point on rates, terms, and conditions that are just, reasonable, and nondiscriminatory," subject to review by the FCC and state commissions.[120] Rural ILECs are exempt from this requirement. In Vermont this requirement only applies to FairPoint, and this is reflected in the FairPoint Statement of Generally Available Terms (SGAT). The SGAT effectively constitutes the FairPoint wholesale tariff, and the prices included in it are cost-based and were approved by the Public Service Board. The SGAT relates prices for telecommunications transport services and dark fiber between FairPoint central offices throughout the state.

Some have expressed frustration that the services laid out in the SGAT do not ideally meet their understanding of Open Access. The SGAT provides prices for services connecting central offices, but some open access proponents envision the ability to purchase fiber at any point along the line. Additionally, the SGAT is only available to qualified telecommunications carriers, and open access proponents suggest it should be available to all companies. SGAT services also generally require colocation arrangements in the central offices of each side of a link, and open access proponents complain that this is excessively complicated and expensive.

120. 47 USC § 251 (c)(3) (3).

The FCC provided important interpretation of this statute in the *Triennial Review Remand* Order (TRRO).[121] In this order the FCC found that the purpose of the *1996 Telecommunications Act* was to facilitate competition in areas where the ILEC held monopoly power. It found that the ILEC could be relieved of these obligations if the market for telecommunications services was not impaired. Based on the rules laid out in the TRRO order, FairPoint sought relief from these obligations in several areas of the state. In 2014, the Public Service Board found that the telecommunications markets in several Vermont urban and suburban central offices were no longer impaired and relieved FairPoint of certain obligations in serving these wire centers.[122]

NTIA and RUS Grants

Recipients of ARRA-funded grants and loans from the NTIA and RUS are required to offer "interconnection, where technically feasible without exceeding current or reasonably anticipated capacity limitations, at reasonable rates and terms to be negotiated with requesting parties." Grants subject to these requirements include three grants to VTel, including the FTTH project, the WOW wireless project, and the middle mile fiber project, as well as the VTA middle mile project (in conjunction with Sovernet). In addition to the grant language, the NTIA offered additional interpretation guidance for recipients, including the following key provisions:

Interconnection. Grantees should be prepared to (a) wholesale a direct connection that it has built to the customer (i.e., loop or lateral); and (b) provide transport services to a last mile provider that is serving the customer (e.g., backhaul, Internet access). Recipients should make all reasonable efforts to allow all requesting parties to interconnect with their facilities regardless of the business model or purpose of the requestor. The requirement to offer interconnection at any technically feasible point along the network includes all points of interconnection set forth in a recipient's approved application, including splice points and mid-span.

Wholesale. Recipients should offer wholesale broadband services at rates and terms that are reasonable and non-discriminatory. Many recipients set forth wholesale pricing in their applications and, as such, those rates will be presumed reasonable and non-discriminatory. Customers will expect certain wholesale services to be provided including, but not limited to, local transmission services, transport, and dedicated Internet access services.

Dark fiber. To the extent that a recipient's business plan involves offering dark fiber, the recipient should consider making available information to requesting parties including, but not limited to, route maps, interconnection points, splice points, and type of fiber.

121. *Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, WC Docket No. 04-313, CC Docket No. 01-338, Order on Remand (rel. Feb. 4, 2005).

122. The term "impaired" refers to competition. In markets where competition is impaired, the successor RBOC is obligated to provide unbundled network elements (such as fiber) at cost based rates. The Board's findings were made following FCC rules that were promulgated in the TRRO Order.

Information. Recipients should provide up-to-date information to parties making bona fide requests regarding the location of grant-funded network routes, including routes containing dark fiber and points of interconnection.

The concerns about business viability described earlier are echoed in the actual grant agreements offered by the NTIA and RUS, which include this additional language, "Notwithstanding the above, the Grantee may not offer interconnection to anyone that will provide services that duplicate services provided by projects funded by outstanding telecommunications loans made under the [Rural Electrification] Act." These provisions indicate that the NTIA and RUS want these grant recipients' business models to succeed, and if other network operators employ the facilities, this may undermine these business models.

Open Access by Choice

In theory all networks are open access at the right price. Facilities based providers must make significant investments in infrastructure before they can begin selling service. Recouping costs and making a profit depend on the ability of providers to sell retail subscriptions. As a result, companies that make such investments often do not share their networks with firms that seek to compete with them. Conversely, new entrants will not purchase network elements from a facility owner at prices that make them uncompetitive with the incumbent. This is especially true in rural areas where an already weak business case would be further undermined by rules allowing competitive entry. ECF Holdings, LLC (ECFiber), which holds itself out as an open access network, captured this problem in its original financing document:

> Under current federal and Vermont law, ECF has no duty to make the System available to third parties, although ECF has stated that it intends to do so. Should federal or state law change in this respect, for example by mandating certain wholesale rates for Services, it could have an adverse affect [sic] on ECF's business and its financial condition.[123]

Rural providers depend on retail subscriptions to drive investment and service debt. Regardless, many community broadband projects, such as ECFiber, have made open access part of the company's mission and have committed to the idea of providing reasonable access on a non-discriminatory basis. As these community broadband providers become established, the contours of what open access by choice means and how it will be implemented will need to be decided.

Many community broadband projects, such as ECFiber, have made open access part of the company's mission and have committed to the idea of providing reasonable access on a non-discriminatory basis.

123. Certificate of Participation (East Central Vermont Community Fiber Broadband Communications Project), SERIES 2008 at 52. This statement may not reflect ECFiber's current policy on open access. Certificates of participation were part of ECFiber's original financing plan, but have since been replaced with an alternative financing strategy. The inclusion of this provision in this section is merely intended to demonstrate the business concerns many carriers have with the imposition of open access rules. At the time of the publication of this document, ECFiber had no publically available, written policy on open access.

POLICY

Vermont should recognize the importance of open access networks to the development of competition within Vermont. It is important to have common carriers that can provide wholesale and retail customers with an open network, allowing new entrants the flexibility to take services and elements and transform them into value-added services.

STRATEGIES

- The State of Vermont should support the inclusion of open access provisions in grant proposals and contracts for broadband facilities investment issued through the Connectivity Initiative, especially where such provisions would enhance competition without undermining future expansion into underserved areas. Such provisions should be carefully tailored to ensure financial success of the project. Any open access policy should include a firm statement prohibiting access discrimination.
- The State of Vermont should advocate for open access policies at the federal level.
- State funded last mile projects should make use of already deployed middle mile fiber where feasible, especially where open access obligations are already imposed on owners of that middle mile fiber.
- State funded middle mile fiber projects should be designed to serve multiple providers at many points along their routes.

Service Adoption

Demand Stimulation

One way Vermont can increase service adoption is by increasing demand for broadband services. Basic telephone service is a good example. Since the 1930s, the national policy has been universal service. As the telephone became a more indispensable part of American life, the penetration rate increased. Use and adoption of broadband applications is on the increase. However, unlike the telephone, broadband adoption is more complicated. Many non-adopters see no need to use information technologies, while others wish to use broadband applications but lack the right skills. Using most broadband applications takes a considerable amount of skill and training. To increase adoption rates, the state should support education and training to residents and businesses on information technologies.

STRATEGIES

- The state should encourage digital literacy programs to address long term growth of the demand in rural areas.
- The state should partner with rural businesses to identify and promote information technology skills programs. Programs should be targeted to develop skills that meet the workforce needs of Vermont businesses.
- State and municipal agencies, state colleges, public and private schools, and other relevant institutions should adopt programs that increase use of broadband based applications at anchor institutions.

- The Division of Connectivity should consider staffing a broadband outreach coordinator to facilitate and coordinate adoption and usage initiatives in a way that maximizes those initiatives' benefits.

Affordability

Another way to stimulate demand for Internet access service is to promote low cost services for lower income and working families. Comcast for instance, as a requirement of its purchase of NBCUniversal, offers a low cost broadband option for $9.95 per month. Eligible Comcast customers have the option to purchase an "Internet ready" computer for $150. VTel, as a requirement of its ARRA funded WOW project, offers a similar low cost broadband solution for $10 per month. These programs are already making Internet Access available to a greater number of families. Such programs should be encouraged and expanded.

STRATEGIES

- The state should consider expanding its VUSF Lifeline program to cover some of the cost of broadband for qualifying recipients.
- The state should consider whether to require low cost service options for certificates of public good.

Public, Educational, and Governmental TV

Vermont has a long history of strongly supporting local public, educational, and government content (PEG). PEG stations offer Vermonters locally generated entertainment and educational programming. PEG also gives viewers access to local government proceedings and school events. PEG stations keep Vermonters in touch with their community. The primary funding source for PEG stations comes from cable television subscriptions through a franchising fee allowed under federal law.[124] Access Management Organizations (AMOs), which create content for PEG stations, may receive up to 5% of the cable operator's gross revenue—the maximum allowed by federal law.[125]

Cable subscriptions have declined in the past four years as viewers migrate to other media sources, such as Hulu, Netflix, and Apple TV. As a result, many AMOs are seeing their funding stagnate or decrease. This trend is expected to continue and will prove challenging to the AMOs. While the state should be supportive of the AMOs, direction will largely come from the FCC. At the same time, technological advances have outpaced PEG stations' ability to offer high-definition content. Many of the comments received by the Department noted the difficulty AMOs face bringing content to Vermonters on new platforms, such as the Internet, without additional funding. Some have suggested that AMOs should be funded by an assessed fee (or tax) on broadband subscriptions. Currently, such a proposal is not supported by federal law, which prohibits special taxes on Internet access subscriptions.

124. 47 U.S.C. § 542(b).

125. *Id.*

POLICIES

- Vermont should consider the many ways PEG stations deliver content and the ways in which most consumers access their content.
- PEG access stations should have funding adequate to serve the needs of the communities they represent. Such funding should not include a tax on retail broadband Internet subscriptions at this time.

Universal Service Programs

In addition to high cost support and the Connectivity Initiative, the Universal Service Fund also supports the following programs.

E-911

E-911 has made significant progress over the past year. In 2013, E-911 initiated a texting service, which allows people the opportunity to use short message service (SMS) to text E-911. This service can be very beneficial in cases where making a phone call is imprudent or impossible. For instance, victims of domestic violence can use the service to request help without alerting the offender that the victim has done so.

An important focus of E-911 will be maintaining efficiency, accuracy and accountability within its system. Act 190 has started the process. Act 190 requires the Secretary of Administration to recommend to the General Assembly a plan for moving E-911 to the Division of Connectivity, the Department of Public Service, or the Department of Public Safety, with a goal toward achieving annual operational savings of at least $300,000.00, as well as "enhanced coordination and efficiency, and reductions in operational redundancies."[126]

Disability Services

Vermont provides two telecommunications specific services to the deaf and hard of hearing through the VUSF Telecommunications Relay Service (TRS) and the Equipment Distribution Program. Through TRS, specially trained communications assistants relay messages between hard-of-hearing, speech disabled, or deaf people who use text telephones and related equipment, and people who communicate via regular telephone. The Vermont Telecommunications Equipment Distribution Program (VTEDP) provides free adaptive telephone equipment to income-qualified Vermonters with disabilities. The VTEDP is funded by the State of Vermont, and none of the equipment requires monthly service fees or initial setup fees. Eligible Vermonters also may obtain or repair equipment, such as a Text Telephone (TTY) or Braille TTY, CapTel phone, amplified phone, flashing lights or loud ringer devices, voice carry-over or hearing carry-over telephones, an electro larynx telephone, or other adaptive telephone equipment. These services are immensely important to not only the deaf and hard of hearing, but also anyone who communicates with such a user.

126. 2014 Acts and Resolves No. 190, Sec 24.

POLICY

Vermont should make it a priority to support technologies that allow hearing and speech-disabled Vermonters to communicate in familiar modes of communication including American Sign Language.

STRATEGIES

- Assistance programs for the deaf, hard of hearing, and speech impaired should continue to provide assistance for devices usable with broadband communications.
- The State of Vermont should ensure that VTEDP continues its mission to provide adaptive telephone equipment to income-qualified Vermonters with disabilities.
- Vermont should consider supporting Internet protocol relay services that ensure quality of service.

Lifeline

The Lifeline Telephone Service Credit offers eligible Vermonters a discount off their monthly phone bills. Qualifying consumers receive credits against their bill from the Vermont and Federal USF. This program helps make basic telephone service affordable for many Vermonters and has done so for over 20 years. The state should endeavor to continue this program and consider expanding it to include Internet access service.

Regulatory Policy

The state's ability to comprehensively regulate telephone companies has waned over the last decade, making the implementation of many policies and goals more challenging. Since the inception of the *Telecommunications Act of 1996*, and the entry of competitive telephone companies, Vermont has relaxed regulation of telephone companies. Ten years ago, the prevailing thought was that competition would come from other wireline carriers purchasing unbundled network elements (UNEs) from RBOCs and their successors. Today, competition is, for the most part, cross-platform. Traditional phone companies compete for residential and business customers with mobile wireless providers and cable companies. Many consumers have also sought a broadband only solution, using nomadic VoIP carriers, such as Vonage and Skype. Vermont's regulatory framework has attempted to address these changes by reducing more traditional regulation where competition can adequately secure basic reliability and customer service. However, the state continues to exercise regulatory authority over basic local exchange service (BLES) and service quality standards for all phone companies. Continued regulation in these areas is important for protecting captive customers who have limited choice of service providers other than the designated ILEC.

Incentive Regulation

As Vermont's dominant carrier, FairPoint is the most regulated provider of telephone service in the state. As competition from cable-based and

wireless providers of voice service has increased, the Department of Public Service has advocated for an incentive regulation plan (IRP) that allows FairPoint to compete on a level playing field with its far less regulated competitors while maintaining some level of rate regulation over basic service. By the state maintaining control over rates for basic local exchange service, consumers in areas lacking competitive choice are guaranteed affordable phone service. It is reasonable to expect that by the time the next Telecommunications Plan is written, FairPoint may no longer be the dominant carrier in Vermont.

The Department has also advocated for holding the Vermont ILECs to service quality standards that fit consumer expectations and are in line with industry norms. FairPoint and all independent phone companies must adhere to the retail service quality standards established in Docket 5903. The Public Service Board established through Docket 5903 a set of generic service quality standards that apply to all local service providers. The purpose of these standards was to set minimum performance levels in areas such as installation and repair, reliability, and companies' handling of inquiries, requests, and complaints.

These measures are valuable for several reasons. First, the standards keep providers focused on basic aspects of network integrity and customer service. They also enable the public and regulators to evaluate companies' performance over time. Companies can be compared with one another. Docket 5903 also established a consumer "bill of rights," which is now incorporated into Public Service Board rules.

Docket 5903 standards were established in 1999 and it may be time to revisit them and assess whether they ought to be updated to reflect the current needs and expectations of the Vermont consumer. In addition, the state should examine whether voice providers other than ILECs, such as VoIP should be subject to service quality standards.

Municipal Telecommunications Providers

Municipal telecommunications networks have proliferated in the United States in the last decade. Vermont has two municipal broadband projects: Burlington and ECFiber.[127] Both providers bring fiber to the home in the areas they serve. Both projects highlight the advantages and disadvantages of public telecommunications entities. Many of the successful municipal projects around the country have received significant federal and state financial support. Vermont's two municipal fiber to the home providers did not receive any federal support for their deployment efforts.

There are many advantages to the entrance of a municipal provider into the market. Municipal providers, especially those that deploy fiber to the home, can help improve the networks of other providers, as increased competition forces incumbents to make upgrades. Municipal entities can also provide

127. As discussed in other sections of this document, ECFiber is not a municipal entity in the traditional sense. It is not a department of a city or town and is not a creation of a town charter. It was created through an inter-local contract.

valuable service in areas where there is no meaningful competition. Such is the case with ECFiber. Its routes go where most other facilities based providers will not.

Municipal telecommunications has the potential to cause negative consequences. Such providers can distort the market for services in areas where meaningful competition already exists. This happens when a municipality subsidizes the cost of service with taxpayer money. Such support gives the municipality a competitive advantage not open to privately owned providers. Such undercutting of price can, in the long run, have the net effect of reducing competition and preventing privately owned providers from expanding service in underserved areas.

Municipal telecommunications entities can also expose municipalities to great financial risk. Building a network is capital intensive and requires sinking a large amount of financial resources into the network before the provider can begin generating revenue. The risk of failure can be high, especially in a competitive market where the new entrant may not win enough subscribers to service its debt. Fortunately, these issues are resolved with a provision of Vermont law that precludes municipalities from pledging taxpayer support for municipal communications entities.[128] Both the benefits and potential negative outcomes should be carefully considered before new municipal telecommunications entities are chartered.

POLICIES

- Vermont should support policies that refrain from funding municipal and state market activity where that activity will have the net effect of reducing competition.
- Community telecommunications should be considered in areas where meaningful competition does not exist. The state should focus on creating replicable models for chronically underserved areas.
- Forms of community broadband other than municipal broadband should be explored.
- Vermont should evaluate whether changes should be made to the existing law governing municipal telecom financing. Public support should be confined to areas where competition cannot produce and maintain a robust wired network. State directed support should not be used for overbuilds of backbone/middle mile infrastructure absent a compelling need. State level grant funding should be spent in ways that maximize federal and private investment and on projects that help end users improve connections.

Mobile and Wireless Service Regulation

Commercial mobile radio service (CMRS) is regulated differently from landline telephone service. Congress limited state action with regard to rate regulation over CMRS, but states maintain authority over "other terms and conditions." States are prohibited from granting wireless carriers exclusive franchises or otherwise creating barriers to entry.[129] Currently, the state

128. 24 V.S.A 1913.

129. 47 U.S.C. § 332 (c) (3) (A).

exercises much of its regulatory authority over CMRS carriers through the siting of telecommunications facilities. Wireless carriers must also seek approval from the Public Service Board to offer service in Vermont. Carriers can obtain a CPG to offer service and are obligated to pay gross receipts tax, file annual reports, and contribute to the VUSF.

Tower Siting

Vermont law provides for a streamlined permitting process for telecommunications facilities. In 2007, the Vermont Legislature created 30 V.S.A. § 248a. Section 248a provided telecommunications carriers seeking to construct telecommunications facilities the option of obtaining a CPG as an alternative to local zoning and Act 250 environmental review.[130] The law was amended in 2011 to provide greater flexibility. Applicants can now quickly obtain a CPG for *de minimis* (very minor) changes to existing facilities. Many Mobile wireless providers have taken advantage of this permitting regime.

Section 248a has been highly successful, allowing for the permitting of new facilities as well as the upgrade to hundreds of existing facilities. The 248a permitting regime allows small upgrades to be quickly permitted through the *de minimis* application process. Applicants may also seek the permitting of new facilities and major upgrades to existing facilities by submitting a "limited size and scope" or "full" petition. Most of the 4G/LTE upgrades by AT&T and Verizon have utilized the *de minimis* provisions. Section 248a has lowered the cost of siting telecommunications facilities, as well as increased regulatory certainty for mobile providers. Section 248a, however, is a temporary law, and is slated to sunset in 2017.

This Plan calls for the continuation of Section 248a. During the 2014 legislative session, the General Assembly crafted new provisions designed to increase town participation in 248a proceedings. With these new provisions now enacted, 248a allows applicants to focus attention on areas where service should be improved. Section 248a will help providers upgrade their networks to 4G/LTE and maintain network reliability and coverage statewide.

One provision of the recently enacted amendments in Act 190 to Section 248a directed the Public Service Board to describe how it interprets the terms "substantial deference" and "good cause" as used in the statute.[131] These terms were intended to provide important direction to the Board as

130. Applicants may still seek permits through local zoning laws and Act 250. Section 248a provides an alternative to that process.

131. Unless there is good cause to find otherwise, substantial deference has been given to the land conservation measures in the plans of the affected municipalities and the recommendations of the municipal legislative bodies and the municipal and regional planning commissions regarding the municipal and regional plans, respectively. Nothing in this section or other provision of law shall prevent a municipal body from basing its recommendations on an ordinance adopted under 24 V.S.A. § 2291(19) or bylaw adopted under 24 V.S.A. chapter 117 by the municipality in which the facility is located. A rebuttable presumption respecting compliance with the applicable plan shall be created by a letter from an affected municipal legislative body or municipal planning commission concerning compliance with the municipal plan and by a letter from a regional planning commission concerning compliance with the regional plan.

to how to weigh recommendations of municipalities with regard to their town plans and conservation measures. Seven towns, two wireless carriers, and the Department of Public Service offered proposals for the definitions. Moving forward, these definitions may be revisited either by the Board or the General Assembly.

The Public Service Board adopted the following definitions:

"Good cause" means a showing that deferring to the land conservation measures in the plans of the affected municipalities and the recommendations of the municipal legislative bodies and the municipal and regional planning commissions regarding the municipal and regional plans, respectively, would be detrimental to the public good or the State's interests articulated in 30 V.S.A. § 202c.

"Substantial deference" means to give significant and meaningful weight to the land conservation measures in the plans of the affected municipalities and the recommendations of the municipal legislative bodies and the municipal and regional planning commissions regarding the municipal and regional plans, respectively.

STRATEGIES

- The state should maintain the 248a permitting regime at least until sufficient infrastructure is established.
- The state should permanently maintain the de minimis filing process so that existing structures can continuously be upgraded to the best available wireless technology.
- The definitions of "substantial deference" and "good cause" as used in Section 248a (c)(2) should be revisited to give greater effect to the plain meaning of the statute.

Mobile Wireless Service Quality and Consumer Protection

As discussed above, the Public Service Board outlined a "Consumer Bill of Rights" in Docket 5903 and incorporated it into Board Rule 7.600. Although Vermont lacks control over rates, the state maintains its authority over "other terms and conditions." When the state applied consumer protections to phone carriers, the rules excluded mobile wireless carriers. At the time, most consumers did not rely on cell phones as their primary telephone. Today, about 30% of Vermont households are wireless only. Many more use wireless as their primary mode of communication, even though they may subscribe to multiple phone services. Perhaps it is now time to revisit Rule 7.600 to review what, if any, benefits consumers might enjoy through the inclusion of wireless providers to Rule 7.600.

STRATEGIES

- Vermont should analyze what, if any, consumer protection measures should be applied to mobile wireless carriers, and consider adopting such measures.

Line Extension Policy

Vermont Public Service Board rules require that cable operators have tariffs for expansion of cable service into unserved areas. Board Rule 8.313 lays out the method these tariffs must use for distributing the costs of the expansion between the cable operator and the affected customers based on density. The Rule indicates that as population density increases, the cable operator share increases. Prior to 2010, the rules required cable providers to conduct house-count surveys and extend cable plant when areas of sufficient density were identified. The rules were revised in 2010 to remove these provisions. The current Rule simply requires that the cable operator contribute toward the cost of consumer-driven line extensions, based on the density of the specific extension. It no longer requires house-count surveys and thus no longer requires proactive line extensions. In addition, before 2010 cable CPGs required companies to periodically determine the appropriate density thresholds based on company-specific data from annual reports. The 2010 revision appears to contemplate an industry-wide Public Service Board process to determine the appropriate build-out density.

STRATEGIES

- Vermont should consider whether the cable line extension rules maximize the number of consumers who can receive service.

Pole Attachment Rules

Utility poles reach everywhere in the state, allowing service providers the ability to serve every location in Vermont. Under Public Service Board rules, any service provider can attach existing utility poles at cost-based rates.[132] The Public Service Board has rules governing how utilities can attach facilities to those poles. The Board rules lay out the method for calculating these tariffs and they specify two pole attachment rates, one for cable operators that do not offer local exchange service, and another for all other entities. This has created confusion. A unified rate may encourage expansion of broadband services into unserved and underserved areas and eliminate confusion.

Another issue surrounding pole attachments is the recurring make-ready problems that delay deployment by attaching entities. Make-ready disputes can last months, and leave attaching entities waiting for the pole owner to act. In 2011, the General Assembly passed legislation directing the Public Service Board to implement a rapid response program so that make ready disputes could be quickly resolved. The Public Service Board has yet to implement changes to Rule 3.7 to start the rapid response program.

POLICIES

- Vermont should have pole attachment tariffs that treat all attaching entities fairly and encourage infrastructure deployment. This should include a unified rate for attaching entities.
- Vermont should have a mechanism for fair and efficient resolution of make-ready disputes.

132. *See* PSB Rule 3.7.

STRATEGIES

- Vermont should consider implementing a unified rate for pole attachments.
- The Public Service Board should promulgate rules implementing a rapid response program. Pole attachment rules should include an effective enforcement mechanism with penalties assessed to the pole owners where necessary.

FCC Advocacy

Decisions about many of the issues confronting the state are made at the FCC. The FCC has instituted several sweeping reforms in recent years, especially in the area of universal service and inter-carrier compensation. As discussed throughout the Plan, many regulatory issues will have to be settled through the FCC. Vermont is largely dependent on federal funding for future broadband build out. As a result, state advocacy in front of the FCC continues to be extremely valuable to the state.

The state has traditionally participated at the FCC through two organizations: the Federal-State Joint Board on Universal Service and the National Association of Regulatory Utility Commissioners (NARUC). Currently, Public Service Board staff participates on the Joint Board. Staff members from the Board and the Department of Public Service sit on the NARUC Committee on Telecommunications. Because FCC decisions will continue to have a large impact on the telecommunications market in Vermont, this Plan calls for the continuation of the state's advocacy at the FCC.

One area where the State has vigorously advocated for FCC action is the area of net neutrality. As discussed in Chapter 1, net neutrality is the idea that Internet Service Providers and backbone providers should have to guarantee non-discriminatory access to Internet traffic to all users. This issue was put into sharp focus in 2006 when it was discovered that some broadband ISPs were "throttling" peer-to-peer Bittorent traffic. The FCC has tried, somewhat unsuccessfully, to impose rules on ISPs that prevent them from discriminating on the basis of content. The FCC's last two attempts at net neutrality rules have resulted in invalidation of those rules by the courts. The FCC so far has relied on its authority under § 706 and Title I of the *Telecommunications Act*. As of the publication of this Plan, the FCC has proposed new rules that continue to rely on the same legal authority that the courts have already called into question. These proposed new rules would allow for paid prioritization of traffic and other measures which may be deemed commercially reasonable traffic management. The State of Vermont has consistently supported an open Internet, and that commitment has never waivered. The State of Vermont opposes the rules being proposed by the FCC at this time. The Department of Public Service and the Public Service Board have together offered comments encouraging the FCC to reclassify broadband from an information service to a telecommunications service.

POLICY

Vermont should support an Internet that is truly open. ISPs should carry all traffic on a non-discriminatory basis. Paid prioritizations arrangements should be discouraged.

STRATEGY

- Vermont should advocate for the reclassification of broadband as a "telecommunications service," along with a level of forbearance necessary to stimulate investment and innovation in the Internet economy.

Conclusion

The policies and strategies discussed above are intended to ensure that the state will reach Vermont's telecommunications goals. This Plan envisions a Vermont where every Vermonter has affordable access to the Internet using the best technology at every location. The Plan also envisions a Vermont where Vermonters have reliable phone service at affordable rates, and where mobility, reliability, and public safety are highly valued characteristics of every network. This Plan offers solutions that are attainable and realistic given today's telecommunications market.

Appendix

Vermont Telecommunications Plan 2014

Number of Locations by Wire Center

Prepared on behalf of the Public Service Department pursuant to 30 V.S.A. § 7501(b)(7) by Stone Environmental, August 5, 2014
This table lists the number of business and residential locations from the Vermont E-911 database located in each Vermont wire center.

Wire Center	Exchange	Telephone Company	CLLI	SGAT	Locations
ADDISON	ADDISON	Waitsfield – Fayston Telephone Co., Inc.	ADSNVTXARS1	O	820
ALBANY	ALBANY	Telephone Operating Company of Vermont LLC	ORLNVTIRRS1	N	465
ALBURG	ALBURG	FairPoint Vermont, Inc.	ALBGVTXADS0	V	1,764
ARLINGTON	ARLINGTON	Telephone Operating Company of Vermont LLC	ARTNVTSCRS1	R	2,168
BARNET	BARNET	Telephone Operating Company of Vermont LLC	BARNVTCHRS1	R	850
BARRE	BARRE	Telephone Operating Company of Vermont LLC	BARRVTELRS1	S	7,438
BARTON	BARTON	Telephone Operating Company of Vermont LLC	BARTVTELRS1	R	2,241
BELLOWS FALLS	BELLOWS FALLS	Telephone Operating Company of Vermont LLC	BLFLVTHERS1	S	1,889
BENNINGTON	BENNINGTON	Telephone Operating Company of Vermont LLC	BGTNVTPLDS0	S	8,228
BENSON	BENSON	SHOREHAM Telephone, LLC	BNSNVTXARS1	O	568
BETHEL	BETHEL	Telephone Operating Company of Vermont LLC	BETHVTMARS1	R	1,988
BLOOMFIELD	BLOOMFIELD	Telephone Operating Company of Vermont LLC	NSFRNHMA962	N	267
BRADFORD	BRADFORD	Telephone Operating Company of Vermont LLC	BRFRVTPGRS1	R	1,136
BRANDON	BRANDON	Telephone Operating Company of Vermont LLC	BRNDVTCARS1	R	2,694
BRATTLEBORO	BRATTLEBORO	Telephone Operating Company of Vermont LLC	BRBOVTMADS0	S	7,697
BRIDGEWATER	BRIDGEWATER	Vermont Telephone Company	BRWRVTXARS1	O	1,177
BRIDPORT	BRIDPORT	Waitsfield – Fayston Telephone Co., Inc.	BRPTVTXARS1	O	689
BRISTOL	BRISTOL	Waitsfield – Fayston Telephone Co., Inc.	BRSTVTAARS1	O	3,943
BROOKFIELD	BROOKFIELD	Telephone Operating Company of Vermont LLC	BRFDVTBCRS1	R	570
BURLINGTON	BURLINGTON	Telephone Operating Company of Vermont LLC	BURLVTMADS0	U	21,349
CABOT	CABOT	FairPoint Vermont, Inc.	CABTVTXADS6	V	1,149
CANAAN	CANAAN	Telephone Operating Company of Vermont LLC	WSTWNHBS266	N	509
CASTLETON	CASTLETON	Telephone Operating Company of Vermont LLC	CSTNVTSORS1	R	1,219
CHARLOTTE	CHARLOTTE	Waitsfield – Fayston Telephone Co., Inc.	CHRLVT01RS1	O	2,280
CHELSEA	CHELSEA	Telephone Operating Company of Vermont LLC	CHLSVTMARS1	R	1,198
CHESTER	CHESTER	Vermont Telephone Company	CHESVTXARS1	O	2,571
CONCORD	CONCORD	Telephone Operating Company of Vermont LLC	CNCRVTMARS1	R	987
CORNWALL	CORNWALL	SHOREHAM Telephone, LLC	CRNWVTXARS1	O	521
CRAFTSBURY	CRAFTSBURY	Telephone Operating Company of Vermont LLC	GNBOVTGB586	N	735
CUTTINGSVILLE	CUTTINGSVILLE	Vermont Telephone Company	CTVLVTXARS1	O	444
DANBY	DANBY	Vermont Telephone Company	DNBYVTXARS1	O	754
DANVILLE	DANVILLE	Telephone Operating Company of Vermont LLC	DAVLVTYARS1	R	866
DERBY	DERBY	Telephone Operating Company of Vermont LLC	DRBYVTMARS1	S	1,291
DERBY LINE	DERBY LINE	Telephone Operating Company of Vermont LLC	DRBYVTMARS1	N	370
DORSET	DORSET	Telephone Operating Company of Vermont LLC	DRSTVTYARS1	R	766
E. CALAIS	E. CALAIS	Telephone Operating Company of Vermont LLC	PLFDVTYARS1	N	788
E. FAIRFIELD	E. FAIRFIELD	Telephone Operating Company of Vermont LLC	EFFDVTMARS1	R	903
EAST CORINTH	EAST CORINTH	Topsham Telephone Company	ECRNVTXADS0	O	1,915
ENOSBURG FALLS	ENOSBURG FALLS	Telephone Operating Company of Vermont LLC	ENFLVTMARS1	R	2,738
ESSEX JCT.	ESSEX JCT.	Telephone Operating Company of Vermont LLC	ESJTVTLIDS0	S	13,060
FAIR HAVEN	FAIR HAVEN	Telephone Operating Company of Vermont LLC	FRHNVTMARS1	R	1,862
FAIRFAX	FAIRFAX	Telephone Operating Company of Vermont LLC	FRFXVTMARS1	R	2,011
FAIRLEE	FAIRLEE	Telephone Operating Company of Vermont LLC	FARLVTMLRS1	R	1,589
FRANKLIN	FRANKLIN	Franklin Telephone Company	FKLNVTXADS1	O	933
GRAFTON	GRAFTON	Vermont Telephone Company	GFTNVTXARS1	O	350
GRAND ISLE	GRAND ISLE	Telephone Operating Company of Vermont LLC	GDISVTYARS1	R	3,350
GREENSBORO	GREENSBORO	Telephone Operating Company of Vermont LLC	GNBOVTGBRS1	R	1,143
GROTON	GROTON	FairPoint Vermont, Inc.	CABTVTXADS6	V	1,348
GUILDHALL	GUILDHALL	Telephone Operating Company of Vermont LLC	LNCSNHHIRS2	N	368
HARDWICK	HARDWICK	Telephone Operating Company of Vermont LLC	HRWKVTPKRS1	R	1,875
HARTLAND	HARTLAND	Vermont Telephone Company	HRLDVTXARS1	O	1,131
HINESBURG	HINESBURG	Waitsfield – Fayston Telephone Co., Inc.	HNBGVTXARS1	O	2,142
HUBBARDTON	HUBBARDTON	SHOREHAM Telephone, LLC	HBTNVTXARS1	O	1,274
ISLAND POND	ISLAND POND	Telephone Operating Company of Vermont LLC	ISPNVTALRS1	R	1,467
ISLE LA MOTTE	ISLE LA MOTTE	FairPoint Vermont, Inc.	ALBGVTXADS0	V	497
JACKSONVILLE	JACKSONVILLE	Telephone Operating Company of Vermont LLC	JCVLVTSCRS1	R	1,437
JAMAICA	JAMAICA	Telephone Operating Company of Vermont LLC	JAMCVTMARS1	R	1,204

JEFFERSONVILLE	JEFFERSONVILLE	Telephone Operating Company of Vermont LLC	JFVLVTVARS1	R	2,210
JOHNSON	JOHNSON	Telephone Operating Company of Vermont LLC	JHSNVTRARS1	R	2,176
LEMINGTON	LEMINGTON	Telephone Operating Company of Vermont LLC	CLBKNHMA277	N	141
LUDLOW	LUDLOW	Ludlow Telephone Company	LDLWVTXADS0	O	2,716
LUNENBURG	LUNENBURG	Telephone Operating Company of Vermont LLC	LNBGVTECRS1	R	753
LYNDONVILLE	LYNDONVILLE	Telephone Operating Company of Vermont LLC	LYVLVTCERS1	R	3,624
MAIDSTONE	MAIDSTONE	Telephone Operating Company of Vermont LLC	GVTNNHSTRS2	N	318
MANCHESTER	MANCHESTER	Telephone Operating Company of Vermont LLC	MNCHVTSCRS1	S	3,645
MARSHFIELD	MARSHFIELD	FairPoint Vermont, Inc.	CABTVTXADS6	V	663
MENDON	RUTLAND	Telephone Operating Company of Vermont LLC	RTLDVTWEDS0	S	488
IDDLE TOWN SPRING	MIDDLE TOWN SPRING	Vermont Telephone Company	MDSPVTXARS1	O	794
MIDDLEBURY	MIDDLEBURY	Telephone Operating Company of Vermont LLC	MDLBVTCCRS1	S	3,407
MILTON	MILTON	Telephone Operating Company of Vermont LLC	MLTNVTELRS1	S	4,691
MONTGOMERY	MONTGOMERY	FairPoint Vermont, Inc.	MTGMVTXADS0	V	862
MONTPELIER	MONTPELIER	Telephone Operating Company of Vermont LLC	MTPLVTSCDS0	S	6,545
MORGAN	MORGAN	Telephone Operating Company of Vermont LLC	MRGNVTTORS1	R	1,504
MORRISVILLE	MORRISVILLE	Telephone Operating Company of Vermont LLC	MRVLVTUNRS1	R	4,657
MOUNT HOLLY	MOUNT HOLLY	Vermont Telephone Company	MTHLVTXARS1	O	1,260
N. SPRINGFIELD	N. SPRINGFIELD	Vermont Telephone Company	NSFDVTXARS1	O	850
N. TROY	N. TROY	Telephone Operating Company of Vermont LLC	TROYVTYARS1	N	989
NEWBURY	NEWBURY	Telephone Operating Company of Vermont LLC	NWBYVTPCRS1	R	319
NEWFANE	NEWFANE	Telephone Operating Company of Vermont LLC	NWFNVTYARS1	R	1,523
NEWPORT	NEWPORT	Telephone Operating Company of Vermont LLC	NWPTVTSERS1	S	3,652
NORTHFIELD	NORTHFIELD	Northfield Telephone Company	NRFDVTXADS0	O	2,514
NORTON	NORTON	Telephone Operating Company of Vermont LLC	ISPNVTAL822	N	510
NORWICH	NORWICH	Telephone Operating Company of Vermont LLC	HNVRNHSCDS2	N	1,528
ORLEANS	ORLEANS	Telephone Operating Company of Vermont LLC	ORLNVTIRRS1	R	1,874
ORWELL	ORWELL	SHOREHAM Telephone, LLC	ORWLVTXARS1	O	741
PANTON	PANTON	Waitsfield – Fayston Telephone Co., Inc.	PNTNVTXARS1	O	629
PAWLET	PAWLET	Vermont Telephone Company	PWLTVTXARS1	O	804
PEACHAM	PEACHAM	FairPoint Vermont, Inc.	CABTVTXADS6	V	463
PERKINSVILLE	PERKINSVILLE	Perkinsville Telephone Company, Inc.	PKVLVTXARS1	O	972
PITTSFIELD	PITTSFIELD	Telephone Operating Company of Vermont LLC	PTFDVTMARS1	R	606
PITTSFORD	PITTSFORD	Telephone Operating Company of Vermont LLC	PTFRVTYARS1	R	1,767
PLAINFIELD	PLAINFIELD	Telephone Operating Company of Vermont LLC	PLFDVTYARS1	R	860
POULTNEY	POULTNEY	Telephone Operating Company of Vermont LLC	PLTNVTBERS1	S	1,527
POWNAL	POWNAL	Telephone Operating Company of Vermont LLC	PWNLVTBERS1	R	1,332
PROCTOR	PROCTOR	Telephone Operating Company of Vermont LLC	PRCTVTPIRS1	S	757
PROCTORSVILLE	PROCTORSVILLE	Ludlow Telephone Company	PRVLVTXARS1	O	768
PUTNEY	PUTNEY	Telephone Operating Company of Vermont LLC	PTNYVTCHRS1	R	1,646
QUECHEE	WHITE RIVER JCT.	Telephone Operating Company of Vermont LLC	WRJTVTGADS0	S	1,433
RANDOLPH	RANDOLPH	Telephone Operating Company of Vermont LLC	RNDHVTPLRS1	R	2,841
READING	READING	Telephone Operating Company of Vermont LLC	RDNGVTMIRS1	R	1,286
READSBORO	READSBORO	Telephone Operating Company of Vermont LLC	RDBOVTTURS1	R	467
RICHFORD	RICHFORD	Telephone Operating Company of Vermont LLC	RCFRVTINRS1	R	1,146
RICHMOND	RICHMOND	Waitsfield – Fayston Telephone Co., Inc.	RCMDVTXADS1	O	3,296
ROCHESTER	ROCHESTER	Telephone Operating Company of Vermont LLC	ROCHVTSPRS1	R	1,318
RUPERT	RUPERT	Telephone Operating Company of Vermont LLC	RPRTVTGRRS1	R	380
RUTLAND	RUTLAND	Telephone Operating Company of Vermont LLC	RTLDVTWEDS0	S	9,286
S. LONDONDERRY	S. LONDONDERRY	Telephone Operating Company of Vermont LLC	SLNDVTYARS1	R	2,739
S. ROYALTON	S. ROYALTON	Telephone Operating Company of Vermont LLC	SRYLVTYARS1	R	2,088
S. STRAFFORD	S. STRAFFORD	Telephone Operating Company of Vermont LLC	SSFRVTYARS1	R	547
SALISBURY	SALISBURY	Telephone Operating Company of Vermont LLC	SLBRVTBARS1	R	730
SAXTONS RIVER	SAXTONS RIVER	Vermont Telephone Company	SXRVVTXARS1	O	955
SHELBURNE	BURLINGTON	Telephone Operating Company of Vermont LLC	SHLBVTPHRS1	S	3,027
SHERBURNE	SHERBURNE	Vermont Telephone Company	SHBNVTXARS1	O	1,168
SHOREHAM	SHOREHAM	SHOREHAM Telephone, LLC	SHHMVTXADS0	O	653
SPRINGFIELD	SPRINGFIELD	Vermont Telephone Company	SPFDVTXADS0	O	2,946
ST. ALBANS	ST. ALBANS	Telephone Operating Company of Vermont LLC	STALVTBARS1	S	8,174
ST. JOHNSBURY	ST. JOHNSBURY	Telephone Operating Company of Vermont LLC	STBYVTSMDS0	S	4,178
STAMFORD	STAMFORD	Telephone Operating Company of Vermont LLC	RDBOVTTURS1	N	451
STOWE	STOWE	Telephone Operating Company of Vermont LLC	STOWVTHIRS1	S	2,926
STRATTON	S. LONDONDERRY	Telephone Operating Company of Vermont LLC	SRTNVTARRS1	R	2,102

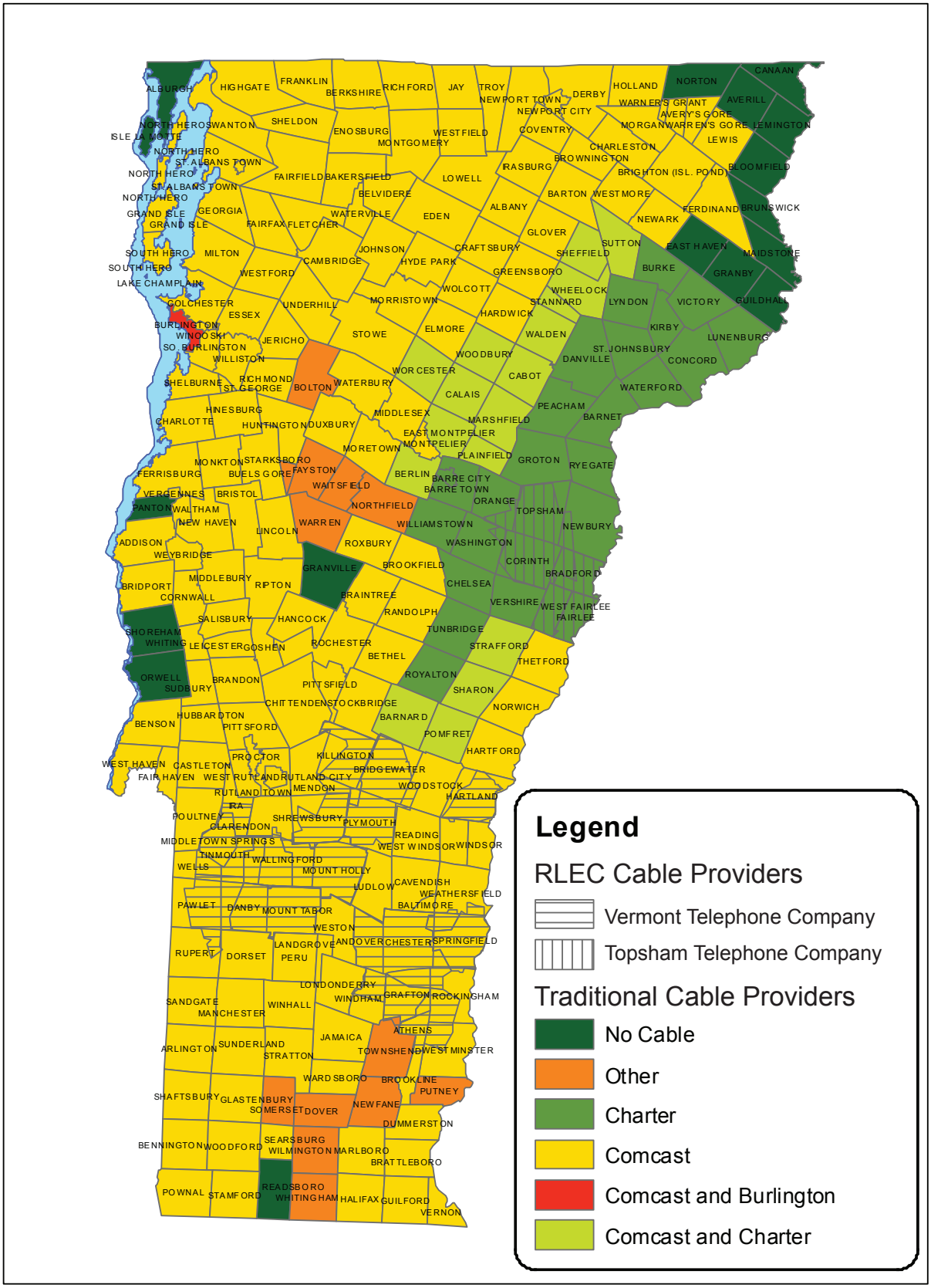
SWANTON	SWANTON	Telephone Operating Company of Vermont LLC	SWTNVTYORS1	R	4,146
THETFORD	THETFORD	Telephone Operating Company of Vermont LLC	LYMENHYARS2	N	925
TROY	TROY	Telephone Operating Company of Vermont LLC	TROYVTYARS1	R	1,158
TUNBRIDGE	TUNBRIDGE	Telephone Operating Company of Vermont LLC	TNBRVTYARS1	R	571
UNDERHILL	UNDERHILL	Telephone Operating Company of Vermont LLC	UNHLVTUCRS1	R	3,256
VERGENNES	VERGENNES	Telephone Operating Company of Vermont LLC	VRGSVTMORS1	R	2,062
W. BURKE	W. BURKE	Telephone Operating Company of Vermont LLC	WBURVTYARS1	R	1,745
W. RUTLAND	W. RUTLAND	Telephone Operating Company of Vermont LLC	WRTLVTBARS1	R	1,367
WAITSFIELD	WAITSFIELD	Waitsfield – Fayston Telephone Co., Inc.	WTFDVTXARS1	O	3,769
WALLINGFORD	WALLINGFORD	Vermont Telephone Company	WLFRVTXADS0	O	1,076
WARDSBORO	WARDSBORO	Telephone Operating Company of Vermont LLC	WRBOVTYARS1	R	1,132
WASHINGTON	WASHINGTON	Telephone Operating Company of Vermont LLC	BARRVTELRS1	N	439
WATERBURY	WATERBURY	Telephone Operating Company of Vermont LLC	WTRBVTSWRS1	S	2,927
WEATHERSFIELD	WEATHERSFIELD	Telephone Operating Company of Vermont LLC	WNDSVTPIRS1	N	40
WELLS	WELLS	Telephone Operating Company of Vermont LLC	PLTNVTBERS1	N	1,180
WELLS RIVER	WELLS RIVER	Telephone Operating Company of Vermont LLC	WDVLNHJLRS1	N	293
WEST DOVER	WILMINGTON	Telephone Operating Company of Vermont LLC	WLMGVTDARS1	R	2,816
WEST NEWBURY	WEST NEWBURY	FairPoint Vermont, Inc.	CABTVTXADS6	V	617
WESTMINSTER	WESTMINSTER	Telephone Operating Company of Vermont LLC	WLPLNHWP722	N	689
WEYBRIDGE	WEYBRIDGE	Waitsfield – Fayston Telephone Co., Inc.	WYBGVTXARS1	O	505
WHITE RIVER JCT.	WHITE RIVER JCT.	Telephone Operating Company of Vermont LLC	WRJTVTGADS0	S	3,611
WHITING	WHITING	SHOREHAM Telephone, LLC	WHNGVTXARS1	O	347
WILLIAMSTOWN	WILLIAMSTOWN	Telephone Operating Company of Vermont LLC	WLTWVTLARS1	R	1,177
WILLIAMSVILLE	WILLIAMSVILLE	Telephone Operating Company of Vermont LLC	NWFNVTYARS1	N	798
WILMINGTON	WILMINGTON	Telephone Operating Company of Vermont LLC	WLMGVTDARS1	R	2,570
WINDSOR	WINDSOR	Telephone Operating Company of Vermont LLC	WNDSVTPIRS1	S	2,065
WINOOSKI	BURLINGTON	Telephone Operating Company of Vermont LLC	WNSKVTWARS1	U	3,036
WOODSTOCK	WOODSTOCK	Telephone Operating Company of Vermont LLC	WDSTVTGORS1	R	2,540
Total					**295,065**

The CLLI column lists the Common Language Location Identifier code maintained by Telcordia.
The SGAT column lists the wire center loop density zone in FairPoint TOC Statement of Generally Available Terms section 5.5.1.2

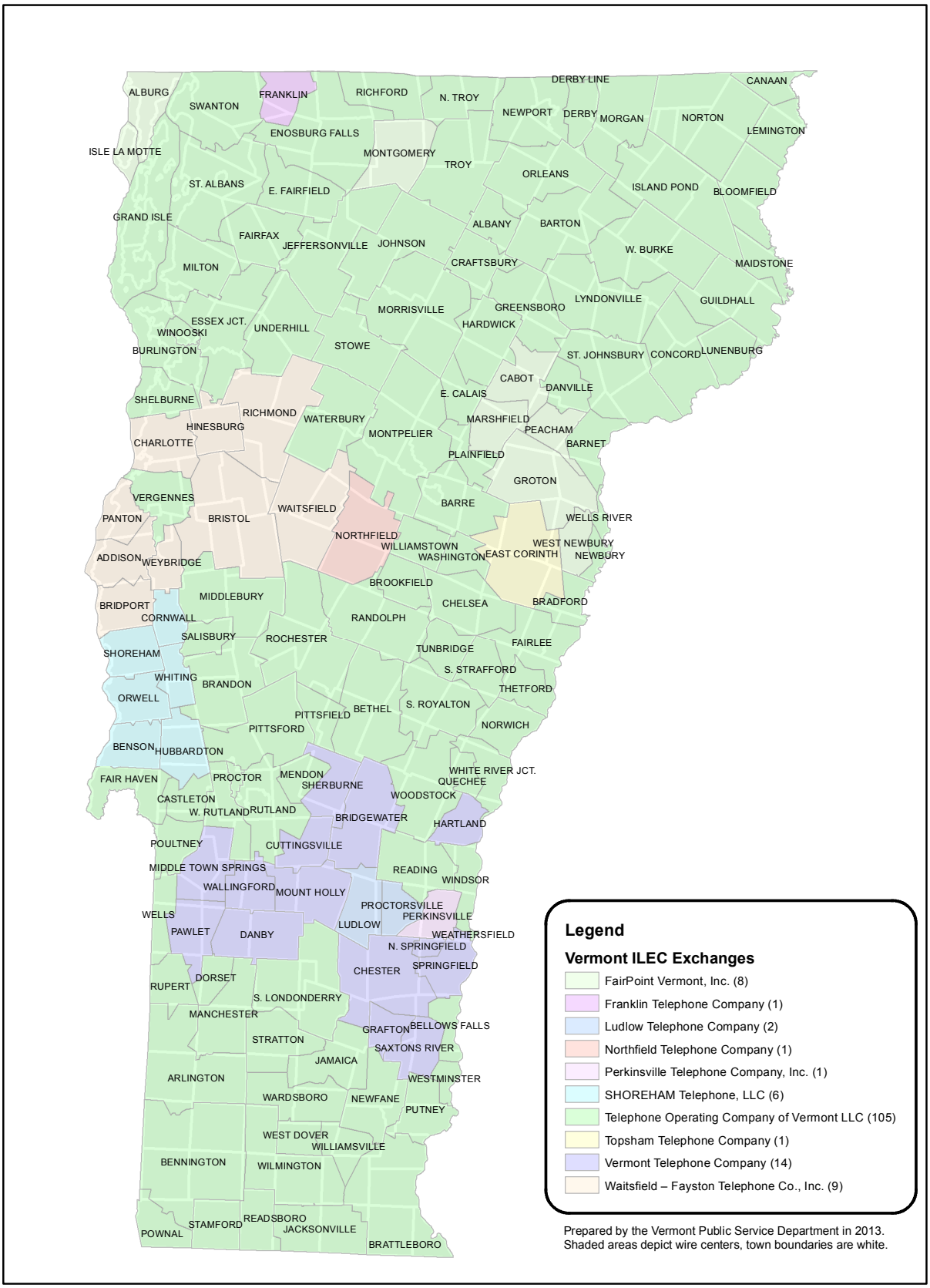
Type	Description
N	Not listed*
O	Not FairPoint
R	Rural
S	Suburban
U	Urban
V	FairPoint Vermont

* These wire centers are served by FairPoint TOC but are not listed in the Vermont SGAT.

Vermont Cable Franchise Areas



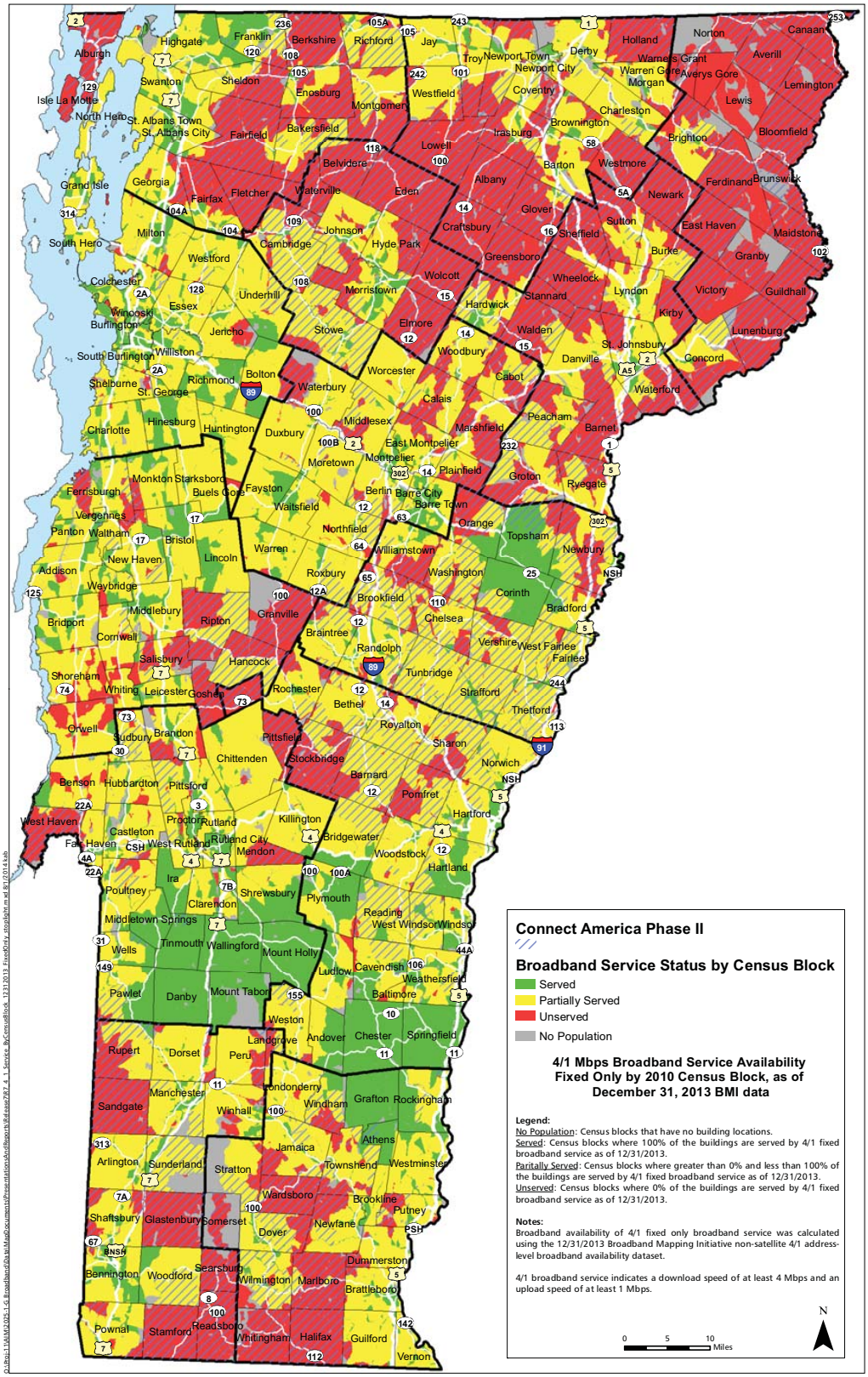
Territories of Vermont Incumbent Telephone Companies



Prepared by the Vermont Public Service Department in 2013.
Shaded areas depict wire centers, town boundaries are white.

4/1 Mbps Broadband Availability

Release 7



Sources: This dataset was developed by Stone Environmental using the non-satellite 4/1 address level fixed only broadband availability dataset developed by the Broadband Mapping Initiative (BMI). The BMI, a collaboration of VCGI, the VT DPS, and the VTA, is funded through a SBDD grant from the NTIA. 2010 census blocks, US Census Bureau; Wire center boundaries, VCGI; Administrative boundaries, VCGI.

STONE ENVIRONMENTAL INC
Produced for the State of Vermont
Release 7, August 1, 2014

2014 Vermont Nonresidential Telecommunications Survey Report

Prepared for the Vermont Public Service Department

by the Castleton Polling Institute
Castleton College
6 Alumni Drive
Castleton, Vermont 05735

August 2014

CASTLETON POLLING INSTITUTE

Amplifying the Voices of Vermont

Vermont Telecommunications Nonresidential Survey 2014

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Vermont Telecommunications Nonresidential Survey | 2014

Introduction

The Polling Institute at Castleton College conducted two independent surveys for the Vermont Public Service Department to measure the public's use of and satisfaction with telecommunications throughout the state. The surveys covered a wide array of issues, including internet, television, cell phone, and traditional landline phone access. The data considered in this report are from the survey of nonresidential organizations.

From June 9 to June 19, 2014, the Castleton Polling Institute surveyed a random sample of Vermont businesses and other nonresidential organizations to assess their current usage of and satisfaction with telecommunications in the state. The sample was drawn from the databases of Dunn & Bradstreet and stratified by business size so that large and small businesses are represented proportionately such that the distribution by size of organizations in the sample match that of the state. The sample was also designed to include all of the major industry sectors represented in Vermont, using the North American Industry Classification System (NAICS) codes as a means of broadening representation. The final sample included 605 completed interviews, representing businesses from all 14 counties in Vermont, and 22 industry sectors.

Summary results

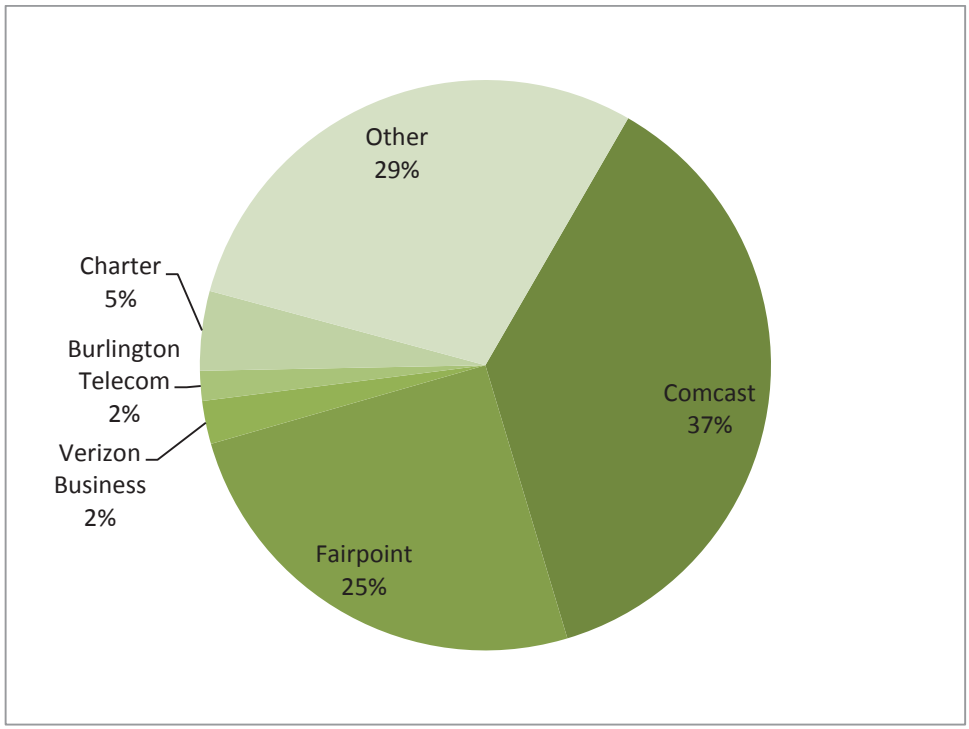
- Whereas the 2012 Vermont Telecommunications Survey Report found that 93 percent of nonresidential respondents had Intnernet connection at their place of business, that value has risen to 97 percent in 2014. In addition, the extent to which those connections are broadband access has also increased from 83 percent in 2012 to 92 percent in 2014.
- Traditional landline telephones still dominate the voice communications market for Vermont businesses; 96 percent have a landline either in lieu of or in addition to cell phone service.
- More than half of Vermont businesses subscribe to cell phone service, although most also have landline service as well. Larger organizations are more likely to use cell phones in addition to landline service.
- While almost half of all nonresidential survey respondents believe that it is fair for all customers to be charged a fee to support the expansion of broadband Internet service in rural areas, only 35 percent believe that telephone rates should increase for all customers to cover the higher costs of rural phone service.
- Overall, nonresidential respondents estimate their total monthly telecommunications costs to be $621.30 on average, although half of the surveyed organizations reported spending $200 or less per month.

Internet Service

Nearly all Vermont businesses (97 percent) have access to the Internet at their business location. As with residential customers, the most prevalent providers of Internet access to businesses are Comcast (37 percent) and FairPoint (25 percent). Ninety-two percent of these organizations connect to the Internet with a high-speed or broadband connection, primarily through DSL (43 percent) or cable (36 percent). Only 4 percent of the nonresidential survey respondents connect to the Internet with a T1 or DS1 line.

Both the overall level of connectivity to the Internet as well as the rate of connectivity by broadband is up from the 2012 survey by 4 percentage points for connectivity and 9 percentage points for broadband among those connected.

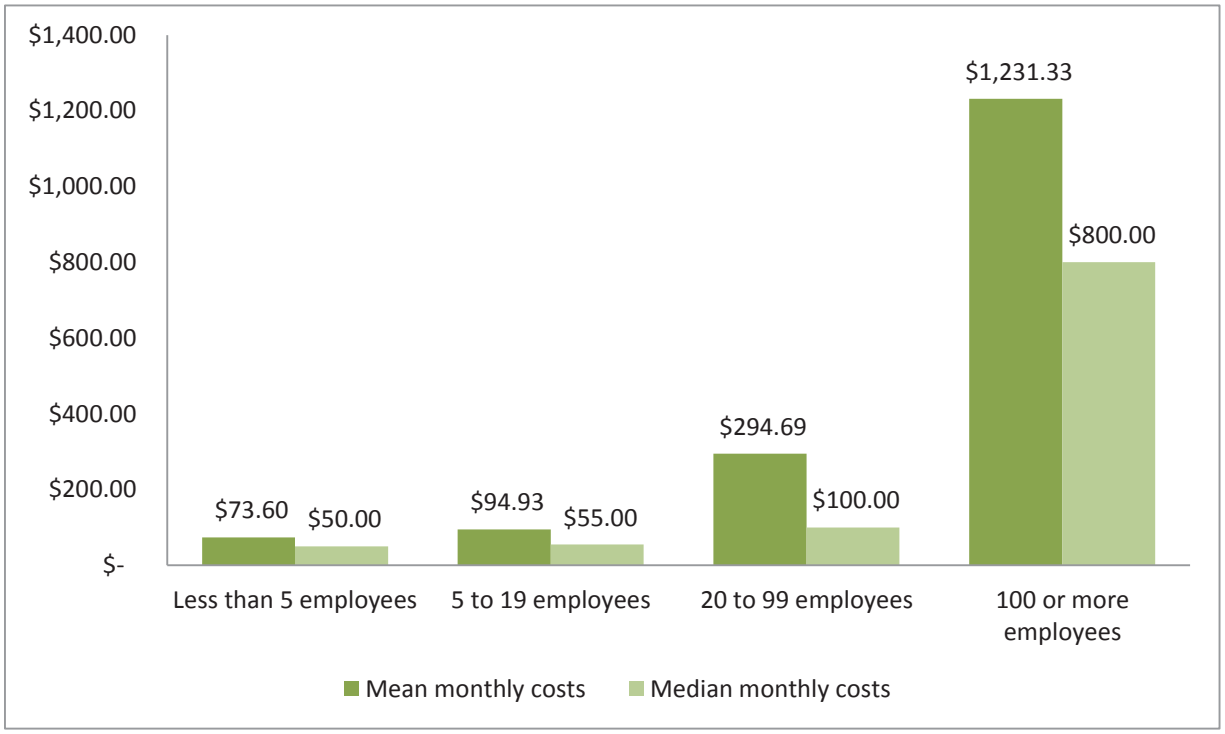
Figure 1. Providers of Internet service to nonresidential consumers



It should not be surprising that the median monthly amount that non-resident organizations pay for Internet connection is identical to the residential median amount ($60) because the majority of businesses in Vermont employ fewer than 5 people; the modal response ($40) is also the same as that for residential customers. The average (mean) cost for businesses, however, is $159.19 due to the much higher monthly rates paid by larger organizations, as illustrated in Figure 2.

Only 14 percent have a secondary internet connection at their business location, a plurality of which (27 percent) is provided by Comcast.

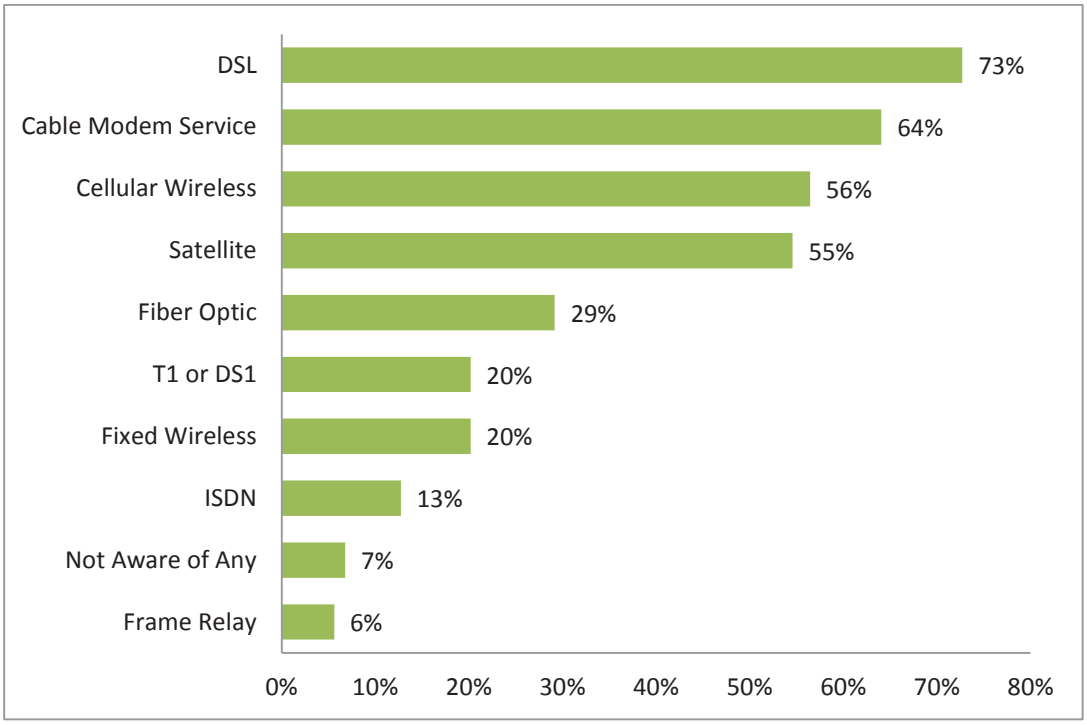
Figure 2. Mean and median monthly Internet service costs for nonresidential customers



Most nonresidential customers are aware of the availability of DSL (73 percent), Cable (64 percent), Cellular (56 percent), and Satellite (56 percent) in their area, but far fewer are aware of fiber optic (29 percent) and the availability of T1 or fixed wireless (20 percent). Figure 3 illustrates the comparative awareness of ways to connect to the Internet from the business location.[1]

[1] It is important to note that "awareness" may not reflect the reality of access to the Internet. It is possible both for organizations to be "aware" of option that do not exist and to not be aware of options that do exist. This is a measure of perception.

Figure 3. Awareness of other connection options among nonresidential customers



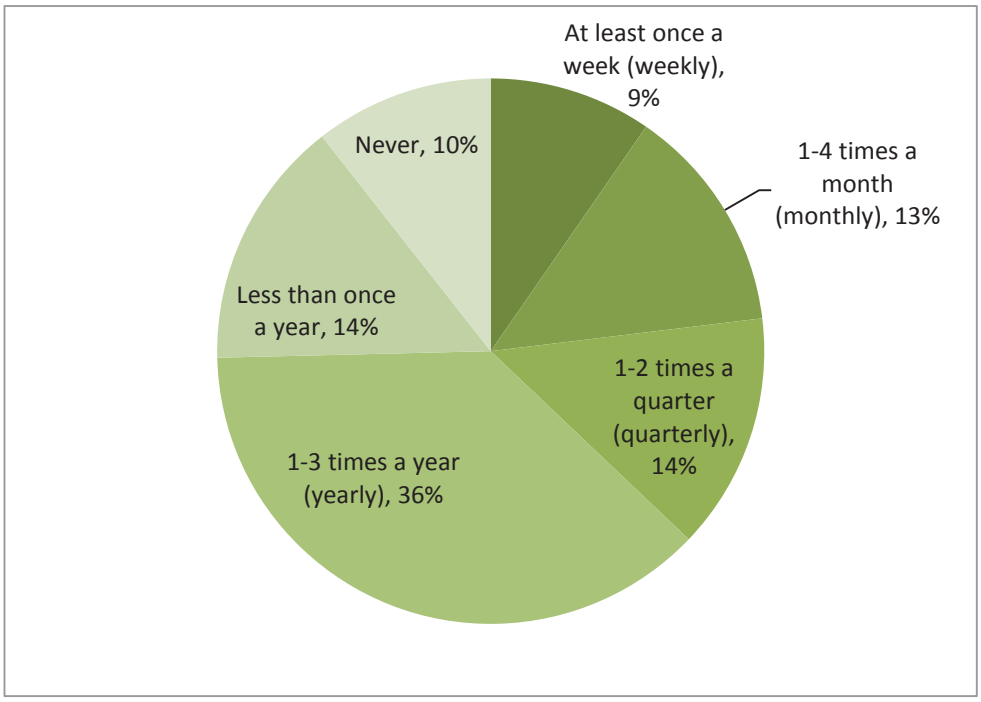
A plurality of respondents (43 percent) believe that upload and download speeds are equally important for their work. Forty-one percent believe that download speed is more important, and only 10 percent believe that upload speed is more important. It appears that concern for upload speed has increased slightly since 2012, where 47 percent touted the importance of download speed without equal regard for upload speed.

Nearly a quarter of all nonresidential respondents (23 percent) cited satisfaction with their current service as the most important reason that they do not switch to faster connections to the Internet. The second most prevalent reason is the cost (19 percent) followed by the perception that there is no faster service available (17 percent).

The 2014 survey asked respondents what factors would be most important in deciding whether to switch Internet service providers. Among reliability, cost, and connection speed, reliability is the most important factor for nonresidential customers, ranked first in importance by 72 percent of survey respondents; 20 percent ranked cost first, and only 8 percent ranked speed as the most important factor. In fact, speed was ranked third by 48 percent of nonresidential respondents.

Nearly one quarter of nonresidential customers say that they experience interruptions in service either never (10 percent) or less than once a year (14 percent). At the other extreme, 9 percent say that they experience service interruptions at least once a week. Respondents' estimations of service lapses in 2014 are down slightly from what was reported in 2012.

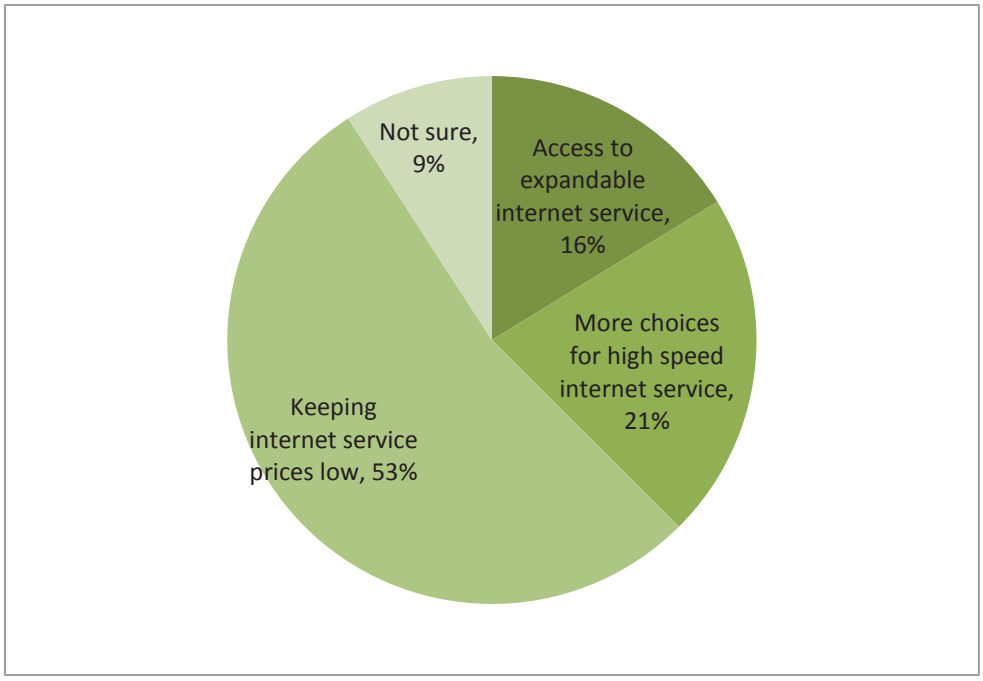
Figure 4. Frequency of service interruptions



Regardless of the number of times nonresidential customers have experienced lapses in service, they tend to rate the reliability of their Internet service very positively. Nearly three-quarters of those surveyed (73 percent) said that their service was very reliable, and another 21 percent said that their service was somewhat reliable. Only 4 percent said their service was either somewhat unreliable (3 percent) or very unreliable (1 percent).

Businesses most commonly cite cost as more important to the future of their business than higher speed or expandable Internet options, as Figure 5 clearly illustrates.

Figure 5. Internet option most important to company's future



On average, Vermont businesses report 74 percent of their workforce uses email at work. The mean value, in this case, belies the fact that for a majority of businesses (63 percent), all of their employees use email at work, and for eight percent of businesses, no employees use email.

The Internet is very important to Vermont businesses for both connecting to customers and to other businesses. Seventy percent of Vermont businesses say they have a website, although the level falls to 67 percent for Central Vermont and 62 percent for businesses in the Northeast Kingdom. The majority of websites (65 percent) are used by both the public and internally; only a third (33 percent) are used only by the public, and just 2 percent are exclusively for internal use.

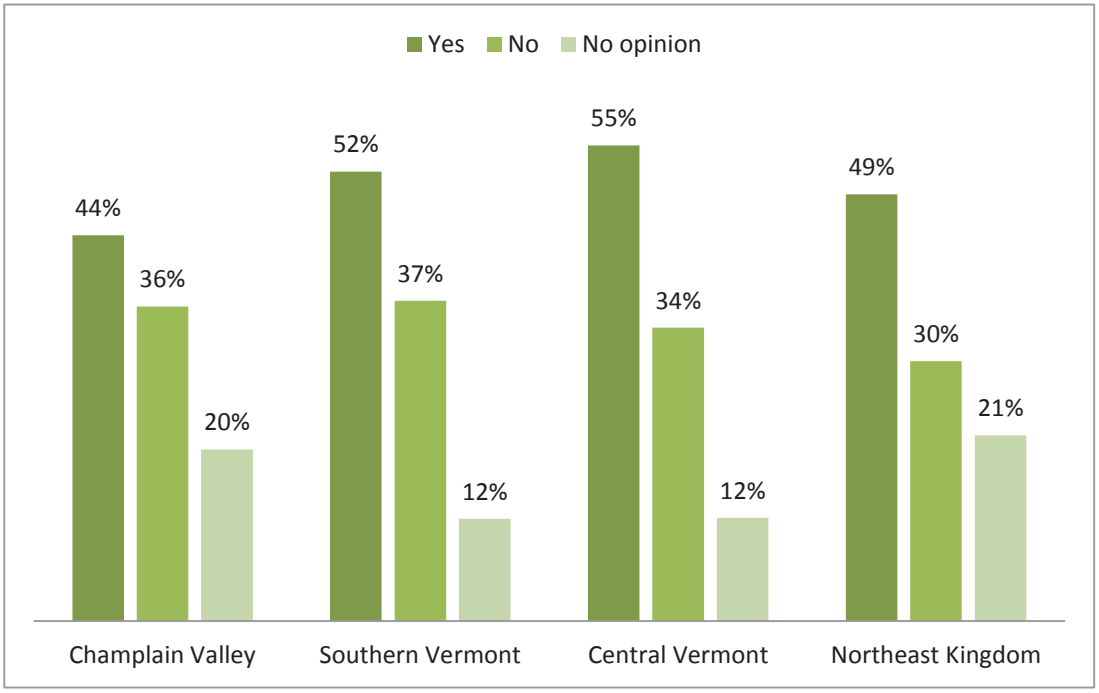
Despite the fact that the public can access 98 percent of business web sites, only 28 percent are set up to allow customers to make purchases online. Of course, the percent of websites that allow customers to make purchases differs greatly by industry classification. Among wholesale trade respondents, 56 percent of the web sites allow customers to make purchases, and among retail trade respondents, 43 percent of the websites are set up for customers to make online purchases.

Eighty-eight percent of businesses purchase materials and services online. Those businesses that do purchase online make on average 39 percent of their purchases online; 71 percent of Vermont businesses overall make zero to less-than-half of their purchases online.

Nearly half of the survey respondents (49 percent) believe “it is fair for everyone to be charged a universal service fee to support expansion of broadband service in rural areas.” Thirty-five percent of all

respondents believe it is not fair, and 15 percent would offer no opinion on the matter.[2] Respondents in the Champlain Valley were the least likely to believe such a service fee is fair (44 percent); the figure below illustrates the regional differences.

Figure 6. Belief that it is fair to charge everyone a universal service fee to support expansion of broadband service in rural areas, by region



Only 7 percent of businesses subscribe to a video service, half of which use an Internet-based service, followed by a cable or fiber-based service (39 percent of video service subscribers).

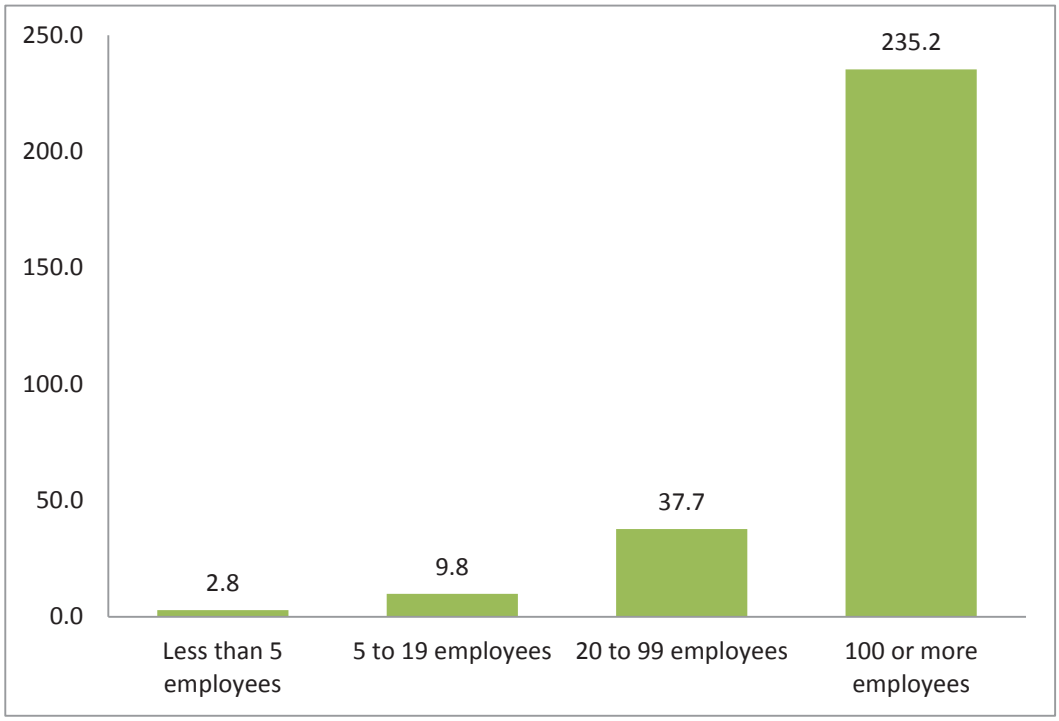
In the event of a lapse in Internet service, only 13 percent of the survey respondents report having a secondary Internet service provider. For those with a secondary provider (n=74), 46 percent rely on a cell phone data service.

[2] These percentages, like those if Figure 6, do not add to 100 percent due to rounding errors.

Landline Telephone Service

On average, nonresidential survey respondents have 19 telephone extensions at their place of business, but naturally, the number of extensions varies significantly by the business size, with an average of 2.8 for businesses with less than 5 employees, and 235 for businesses with 100 or more employees.

Figure 7. Average number of telephone extensions, by company size



As with residential customers, FairPoint is the most prevalent provider of landline service to businesses, providing service to 43 percent of our nonresidential respondents. The next most prevalent provider is Comcast, with 24 percent of the market. The marketshares for FairPoint and Comcast among nonresident customers remains fairly consistent with the values reported in the 2012 survey (44 and 21 percent, respectively).

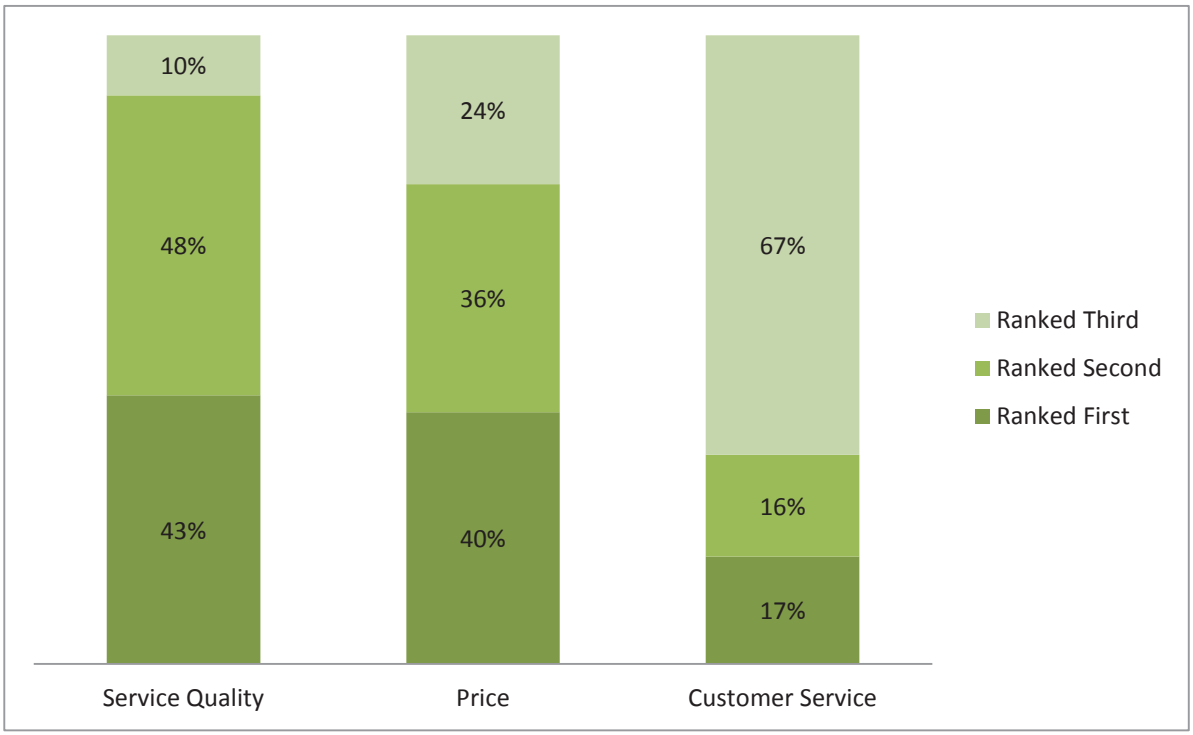
In response to what other providers are available in their area, 39 percent of respondents could not name another provider, and 37 percent could name only one other; 17 percent could name two other providers, and five percent could name three. On average, respondents could name one other provider. The most common provider named was FairPoint (by 40 percent of respondents) followed by Comcast (29 percent).

A majority of businesses (66 percent) have no contract with their landline service provider; they simply pay month-to-month with neither an obligation to keep nor penalty for dropping the service. The rate of those who report having such a contract is higher in the 2014 survey (27 percent) than in the 2012 survey (18 percent). Only 6 percent of the nonresidential survey respondents are considering changing

their primary telephone service provider to an Internet-based provider, such as Skype or Vonage, and only 3 percent are considering switching their primary phone provider to a cell phone service.

When considering whether to switch service to another provider, 43 percent ranked the service quality as the first consideration, and 40 percent ranked price as the first consideration; only 17 percent ranked customer service as the first consideration. The relative importance of these three factors is illustrated in the following figure.

Figure 8. Relative importance of factors involved in deciding to switch telephone providers



Despite the fact that few respondents have plans to switch providers at the time of the survey, one in five (20 percent) say that they have switched providers in the last three years. Among companies with 100 or more employees, however, only 11 percent have switched providers in the last three years. Of those who have switched providers (n=114), 35 percent say that they would consider going back at some point.

About one third of the survey respondents (34 percent) say that their organization has a secondary provider for telephone service in case of an outage. The prevalence of having a secondary provider does not increase with the size of the organization; 37 percent of those with less than 5 employees and 36 percent of those with 100 or more employees have a secondary provider. For the vast majority with a secondary provider (86 percent), the secondary service is a cell phone service provider.

A large majority of nonresidential customers (74 percent) have a service package that sets a fixed rate for all calls, including long distance. Only 18 percent have a plan that charges per-minute tolls that vary.

Overall, 29 percent of respondents say that it is very important to have the entire state as their local calling area; however, for respondents in the Northeast Kingdom, it is very important to 41 percent.

Figure 9. Importance of having the whole state as a local calling area

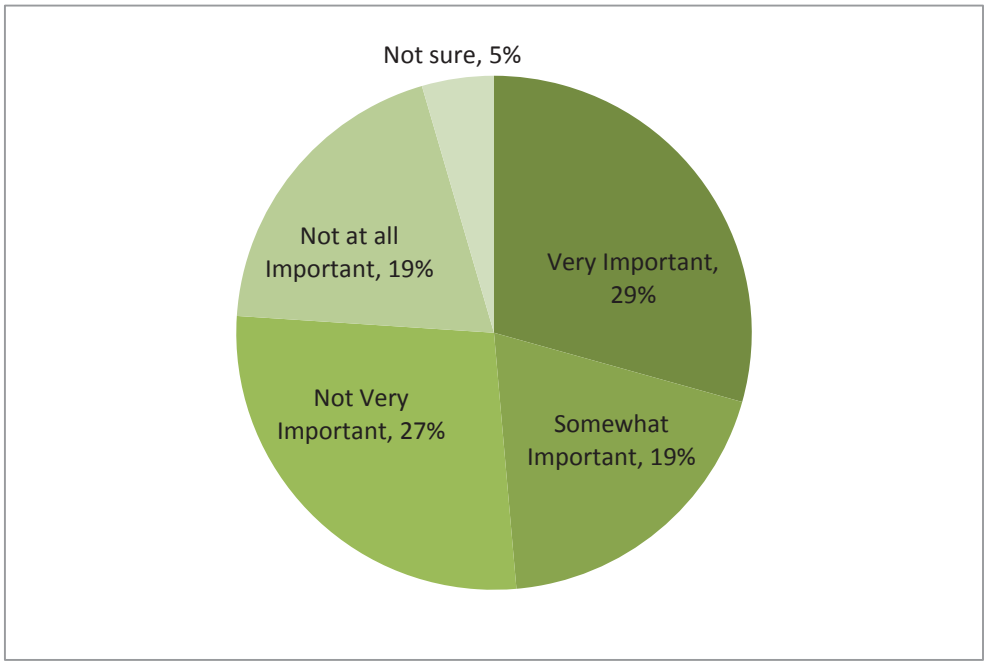
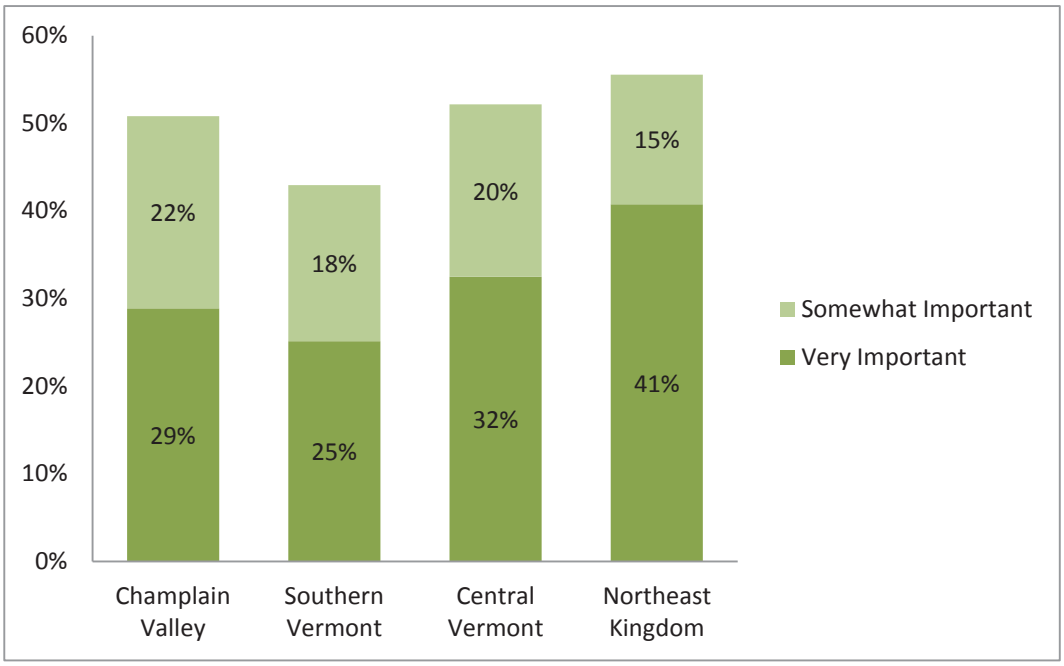


Figure 10. Importance of having the whole state as a local calling area, by region



As in the 2012 survey, despite many respondents expressing the importance of having the entire state as a local calling area, few are willing to pay more for it. Only 22 percent say that they would be willing to pay more for local service in order to have the whole state as a local calling area, although 44 percent of those for whom having the entire state as a local calling area is *very important* are willing to pay more for local service.[3]

[3] The 2012 survey reported similar findings.

About a quarter of those willing to pay more (n=128) will pay $9 per month above what they currently pay; 10 percent are willing to pay $6 more, and 26 percent are willing to pay $5 more. In other words, 60 percent are willing to pay $5 or more per month to have the entire state as their local calling area.

Table 1. Amount extra that nonresidential customers are willing to pay t have the entire state as a local calling area, among those willing to pay[4]

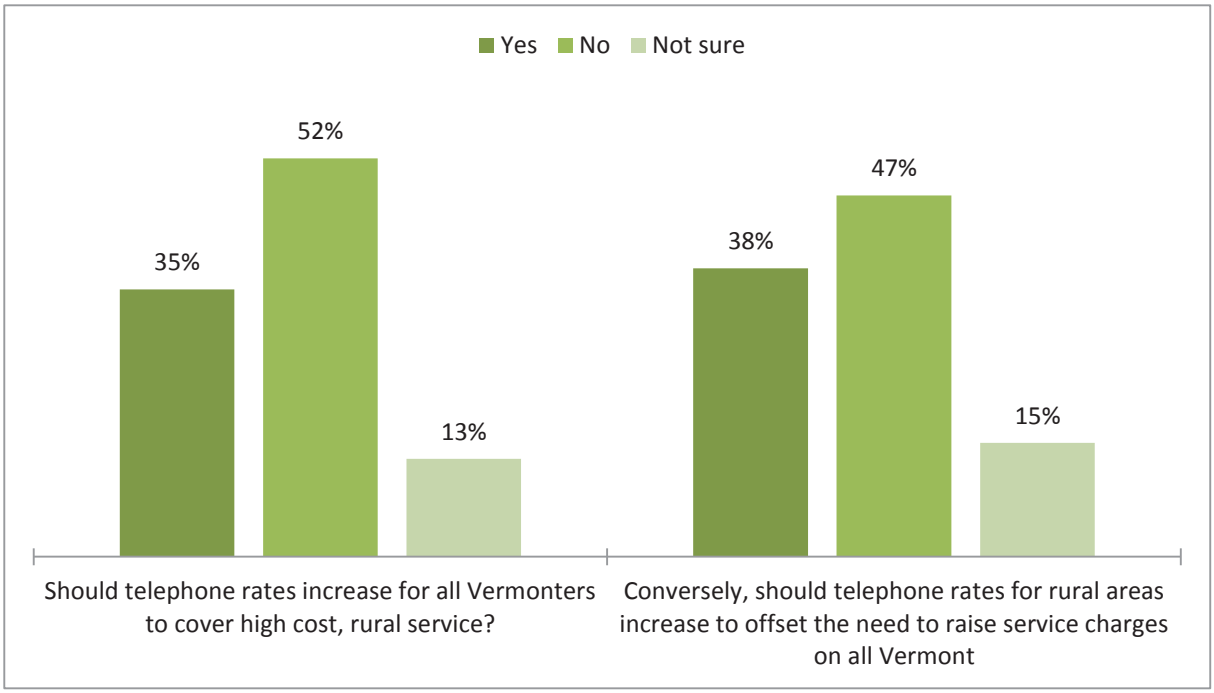
Extra per month	2012	2014
9 dollars	21%	24%
6 dollars	9	10
5 dollars	37	26
4 dollars	9	4
3 dollars	8	5
2 dollars	4	2
1 dollar	3	4
50 cents	-	3
Nothing	1	5
Not sure / Refused	6	17

On average, respondents say that they are willing to wait on the phone as long as 4.9 minutes to speak to a customer service representative when calling their telephone service provider. The median time to wait for a representative on the phone is 4 minutes. A plurality of respondents (43 percent) say that it is reasonable to wait a day (24 hours) for a line in need of repair to be fixed before the wait becomes unacceptable, but the average response was 18.2 hours.

While a majority of nonresidential survey respondents say that it is either very important (32 percent) or somewhat important (28 percent) for the state to fund high-cost rural service, a smaller majority (52 percent) do not think that it is fair for all rate payers to pay higher rates to cover the high cost of rural service. Phrased differently, a plurality (47 percent) does not think that the rates for rural areas should be increased due to the relatively higher costs of providing that service. It seems that respondents want the state to address the need for providing service to rural organizations, but they do not want the costs passed on to themselves.

[4] Given the small sub-sample sizes for the number of organizations willing to pay more to have the entire state as a local calling area, the differences between the 2012 and 2014 surveys are not significant.

Figure 11. Opinions about who should bear the cost of providing rural telephone service

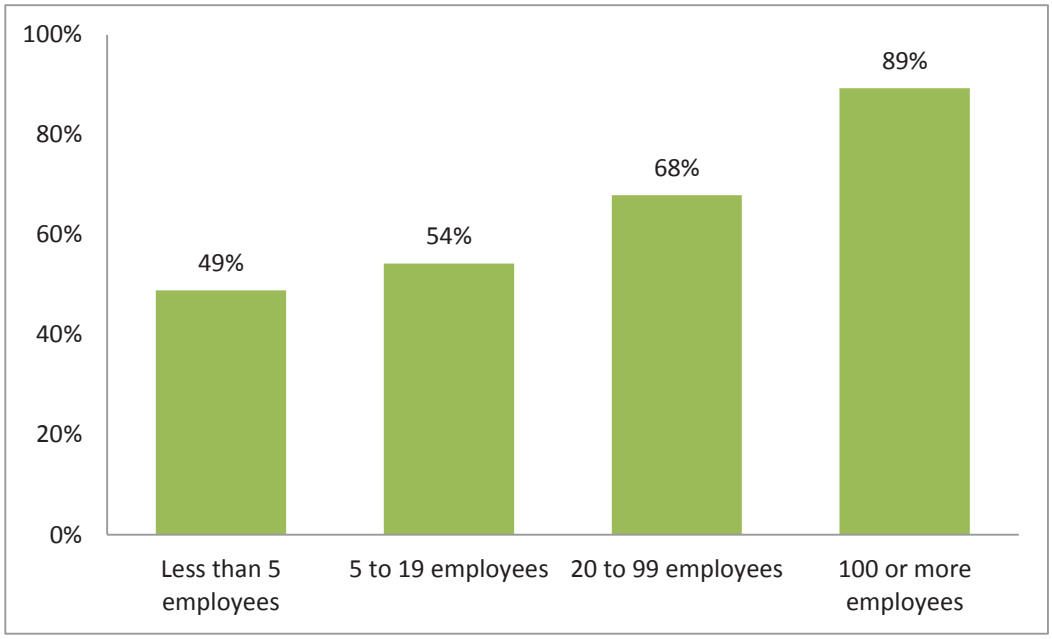


Only seven percent of the companies surveyed use a virtual private branch exchange (virtual PBX) at any of their locations. Naturally, the virtual PBX systems are more common among larger companies, with 25 percent of those with 100 or more employees using those systems.

Cell Phone Service

A majority of nonresidential respondents (54 percent) subscribe to a cell phone service for their organization. The 2012 survey found 57 percent of nonresidential respondents have cell phones—a difference that is well within the margin of error—so we might conclude that there has been little if any change in the use of cell phone among Vermont businesses. Having cell phone service is most common in the Champlain Valley (58 percent) and least common in the Northeast Kingdom (45 percent). As the following figure illustrates, it is also more common among larger organizations.

Figure 12. Percent of organizations subscribing to cell phone service, by number of employees



Of those organizations with cell phone service (n=310), 73 percent make half or less than half of all of their organization's calls from cell phones, although nine percent make all of their calls on cell phones. On average, organizations with cell phone service make 40 percent of their calls from cell phones rather than landlines. Consequently, the vast majority of calls from nonresidential customers are still made on traditional landlines.

Organizations with cell phone service have 8.7 cell phones on average. While 26 percent of those organizations have only one cell phone and 23 percent have just two cell phones, the largest number reported by an organization is 285, pulling up the average for all organizations. The median number of cell phones is three and the modal number is one. Naturally, the average number of cell phones for organizations increases as the number of employees increase such the average for that organizations with less than five employees is 2.4 , and for organizations with 100 or more employees it is 54.

While it was not common for organizations to have a contract for landlines that set a cost over a period of time, contracts are the norm for cell phones. Seventy-one percent of organizations with cell phones

have a fixed contract; in 2012, 74 percent had such contracts. Only about 6 percent use a pre-paid service for their cell phones.

As in the 2012 survey, the two most common cell phone providers for nonresidential customers are AT&T (48 percent) and Verizon (48 percent). Sprint PCS provides service to about 4 percent of the survey respondents, and US Cellular and Tracphone each provide service to 3 percent of nonresidential organizations. Other providers account for service provided to 4 percent of all businesses.[5]

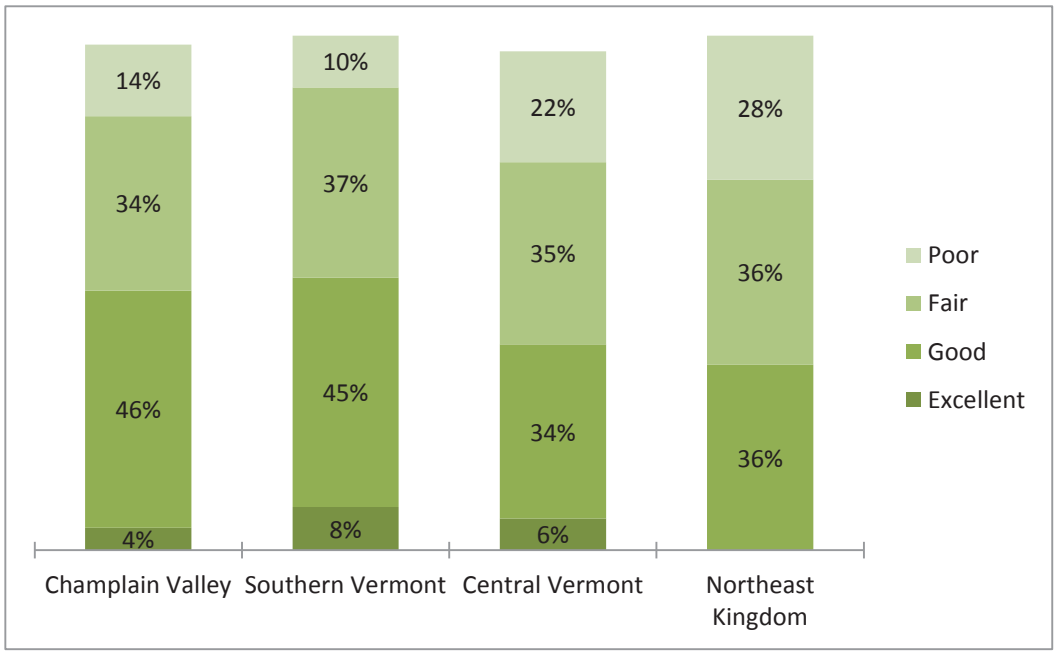
Most nonresidential cell phone customers receive a signal for their cell phones at their business location, although 10 percent say that the signal only works outside. Seventy-seven percent can receive a signal indoors at their place of business. Eleven percent receive no signal at their place of business.

All of the plans purchased by nonresidential organizations include voice, and 90 percent include texting service as well. Eighty-one percent of the plans also include data.

In general, nonresidential customers do not rate cell phone coverage across the state very highly. Half of all respondents said that coverage was either fair (35 percent) or poor (15 percent), while nearly as many rate service as excellent (6 percent) or good (42 percent). Opinions about the level of coverage vary by region, with those from Central Vermont and the Northeast Kingdom rating coverage lower than organizations from the Champlain Valley or Southern Vermont, as illustrated below.

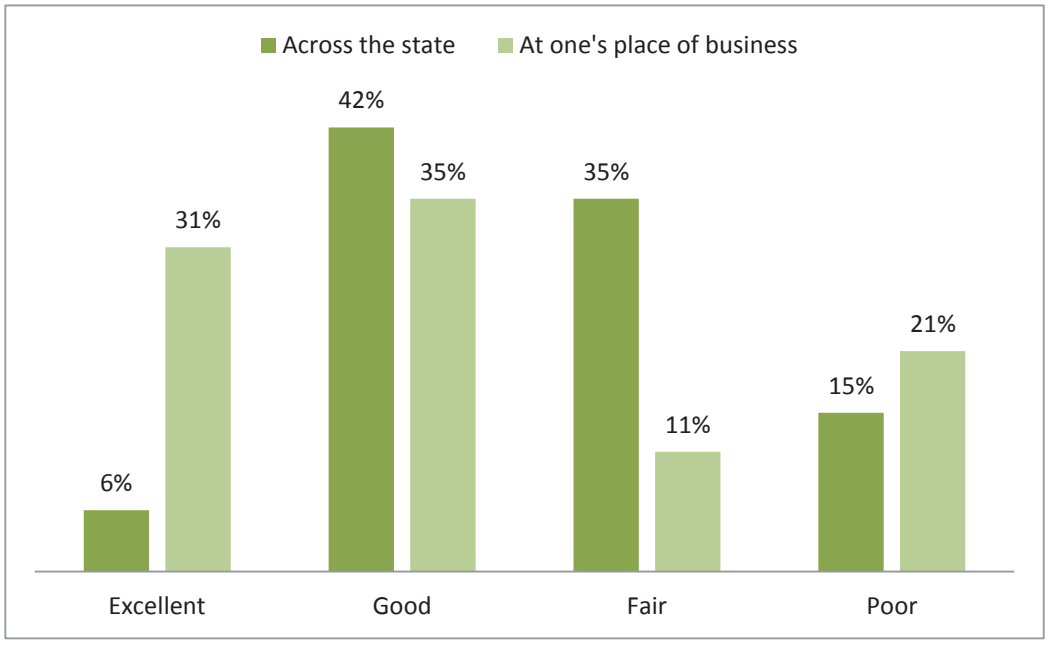
[5] The number of providers exceeds 100 percent because 25 organizations get service from multiple providers. In addition, while the values differ from the 2012 survey by as much as 10 percentage points, the margins of error in both surveys are much higher for this question due to the size of the sub-sample of cell phone customers among nonresidential respondents.

Figure 13. Rating cell phone coverage across the state, by region



Nonresidential organizations rate the cell phone coverage at their place of business, however, much better than they rate coverage across the state. A clear majority rate cell phone coverage at their place of business as either excellent (31 percent) or good (35 percent). Opinions about cell phone coverage at one's place of business vary more dramatically, as 21 percent rate that coverage as poor.

Figure 14. . Rating cell phone coverage across the state and at one's place of business



A majority of cell phone customers (58 percent) believe that cell phone service is as reliable as landline service *where it is available*; 40 percent say it is not as reliable. Those in the Northeast Kingdom are even more likely to say that cell phone service is as reliable as landlines, with only 16 percent saying it was not.

As with landlines, respondents ranked service quality as the most important factor that may lead them to change to another cell phone company, followed by price, and lastly customer service—79 percent ranked customer service third most important.

Figure 15. Relative importance of factors involved in deciding to switch cell phone providers

Thirty-one percent say that they have used a telephone service provided by a cable company. Of those, 85 percent used Comcast for the service. Fewer people (19 percent) have used a nomadic VoIP service to make calls. A majority of those who have used nomadic VoIP rate the service quality as either excellent (22 percent) or good (39 percent). A majority (51 percent) rate the price as excellent and another 21 percent rate the price as good. Users of nomadic VoIP, however, do not rate customer service very highly (see Figure 16 below). A majority (58 percent) have used video chat through nomadic VoIP.

Figure 16. Rating service quality, price, and customer service of nomadic VoIP

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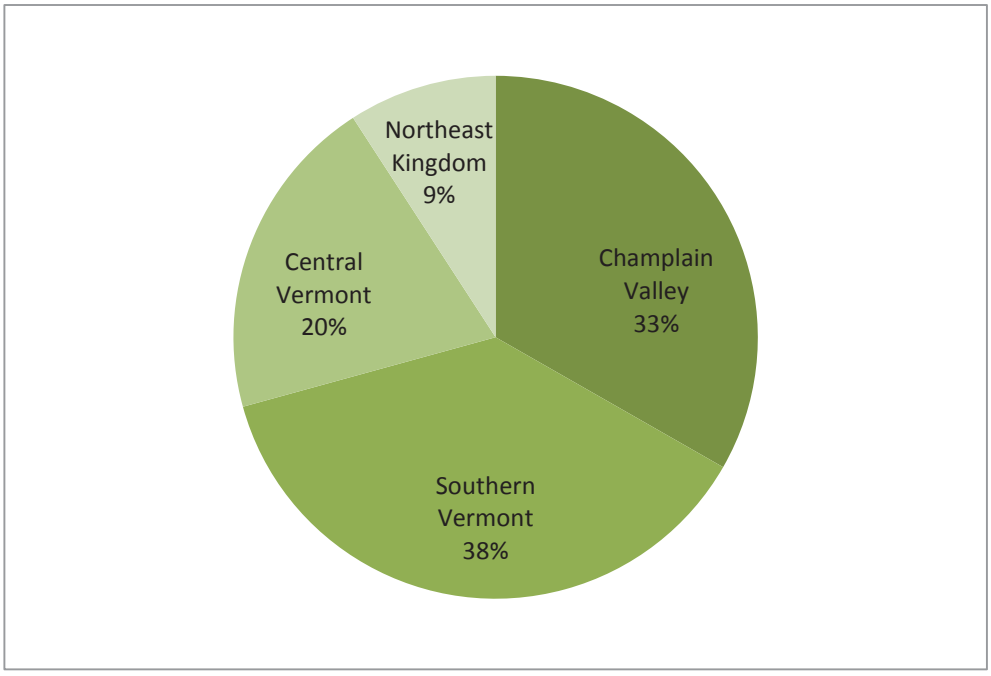
Sample Demographics

The average amount that Vermont businesses spend per month on telecommunications is $621.30, with a median amount of $200. Large organizations—those with 100 or more employees—spend an average of $7,815.63 per month in telecommunications, with a median value of $2,650.

The data used in this report are not weighted, representing the researchers best estimate of the state's business universe through random sampling. Organizations included in this survey represent all 14 Vermont counties. Figure 17 illustrates the regional distribution.

Figure 17. Unweighted regional distribution of surveyed organizations



For 94 percent of the organizations surveyed, their primary location is in the state of Vermont, and the average number of locations for each organization is 1.55. One third of those surveyed are home-based businesses. For 65 percent of the organizations, the people that they serve are mostly in Vermont, but for 15 percent, the people served are mostly outside of Vermont. Seventeen percent of the businesses surveyed serve about an equal number of people inside and outside of Vermont.

The majority of nonresidential respondents (59 percent) in our survey are small businesses with fewer than 5 employees. The U.S. Census Bureau's "2012 County Business Patterns" estimates the percent of businesses in Vermont with fewer than 5 employees in 2012 to be 57 percent, or 12,081 businesses.

Figure 18. Distribution of surveyed organizations by size

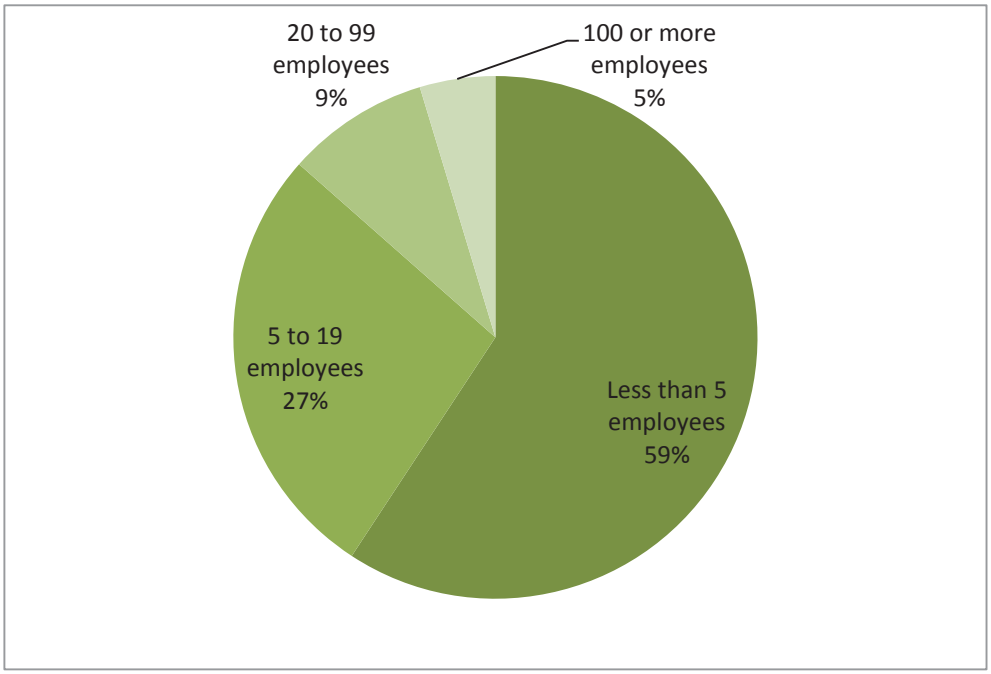
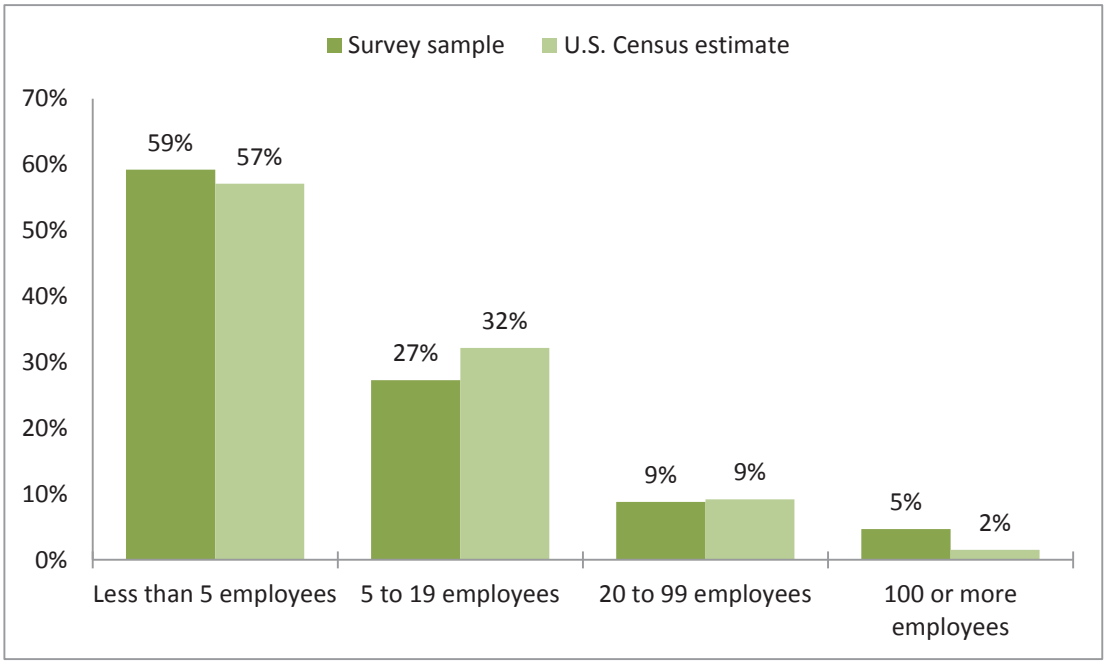


Figure 19. Comparison of survey sample and U.S. Census estimates of Vermont businesses, by size



2014 Vermont Residential Telecommunications Survey Report

Prepared for the Vermont Public Service Department

by the Castleton Polling Institute
Castleton College
6 Alumni Drive
Castleton, Vermont 05735

August 2014

CASTLETON POLLING INSTITUTE

Amplifying the Voices of Vermont

Vermont Telecommunications Residential Survey 2014

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Introduction

The Polling Institute at Castleton College conducted two independent surveys for the Vermont Public Service Department to measure the public's use of and satisfaction with telecommunications throughout the state. The surveys covered a wide array of issues, including internet, television, cell phone, and traditional landline phone access.

The residential survey began on June 25 and ended on July 10, 2014. Respondents were chosen using random selection from a dual-frame sample of all landlines and cell phones in the 802 area code. Respondents within households were selected by asking for the individual "who knows the most about the household's telephone and computer activities." Consequently, the gender and age distributions in the final sample do not match the state's gender distribution, and the survey should be seen as representative of households, not individuals.

Summary results

- Seventy-four percent of Vermont households purchase broadband Internet access, up from 56 percent in 2012.
- Half of all respondents pay $60 per month or less for their Internet service, but because of bundling, many respondents reported their overall monthly payments that include other services, such as cable television.
- Comcast and FairPoint remain the two most common Internet service providers for Vermont households.
- About two-thirds of Vermont households consider the landline to be their primary telephone service, although about three-quarters of landline users also use a cell phone.
- Verizon is the most prevalent cell phone provider (45 percent); AT&T provides service to 39 percent of households.
- A plurality of households (42 percent) get their television service through cable; 34 percent get television via satellite, and 9 percent get television service through the Internet.

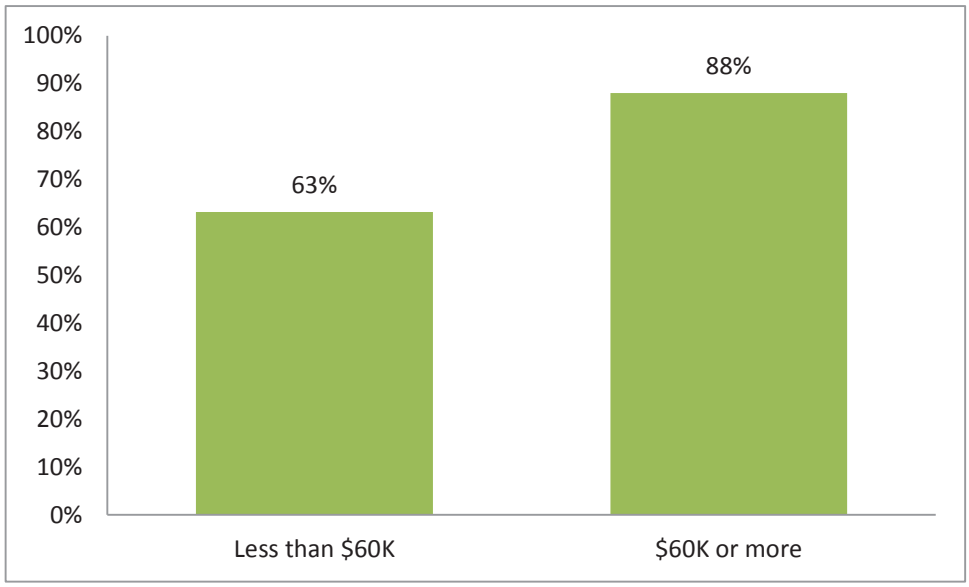
Internet

A super-majority of Vermonters (85 percent) believes that broadband Internet access is available where they live, whether or not they subscribe to a service. In the Northeast Kingdom, only 76 percent believe that broadband access is available to them, and households with income below $60K are less likely to believe that broadband access is available to them where they live than are those from households earning more than $60K (81 percent to 91 percent, respectively).

About three-quarters of all households surveyed (74 percent) say that they purchase broadband access at their homes. Naturally, higher-income households are more likely to purchase broadband access than are lower income households (see illustration below), and those living in the Champlain Valley are most likely to purchase broadband access. The most prevalent response to the question, "Why don't you purchase broadband Internet access at home?" is that they do not really want it or that they don't have a computer. Several respondents cited access limited to dial up connections as their primary reason, and about an equal number cited the costs as the primary reason for not purchasing broadband access.

For the 24 percent who do not purchase the Internet at home, only 6 percent (1 percent of the entire sample) say that they plan to purchase it within the coming year; the majority of those who do not purchase the internet at home (64 percent of non-purchasers, 16 percent of the overall sample) say that they will never purchase Internet services. Older respondents were more likely to say that they will never purchase broadband access.

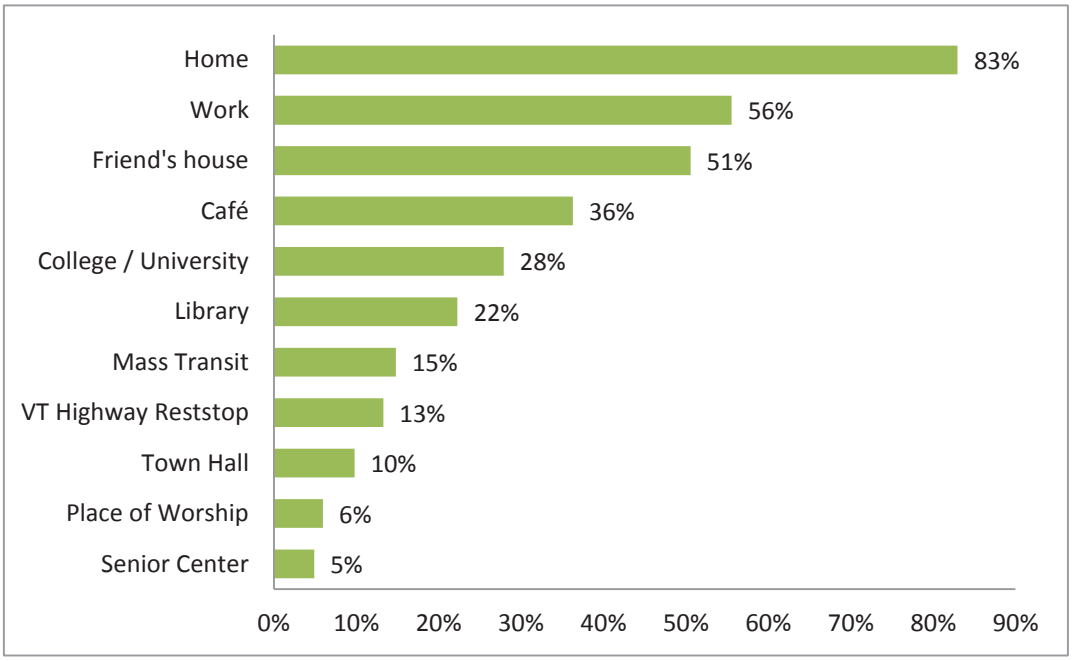
Figure 1. Percent of Vermont households that purchase broadband Internet access, by Income



Eighty-three percent of residential respondents said that they use the Internet at home.[1] Not surprisingly, the percentage using the Internet at home increases with the level of household income. In households with incomes below $60K , 75 percent use the Internet at home, whereas in households with incomes above $60K, 96 percent use the Internet at home. In addition, households with no children were less likely to report using the Internet at home (82 percent) than were households where children are present (94 percent).

Just over half of residential respondents (56 percent) also use the Internet at work; this also differs dramatically by income, with 40 percent of those with household incomes below $60K and 77 percent of those with incomes above $60K using the Internet at work. Figure 2 (below) illustrates the various places where Vermonters access the Internet.

Figure 2. Percent of Respondents using the Internet at places

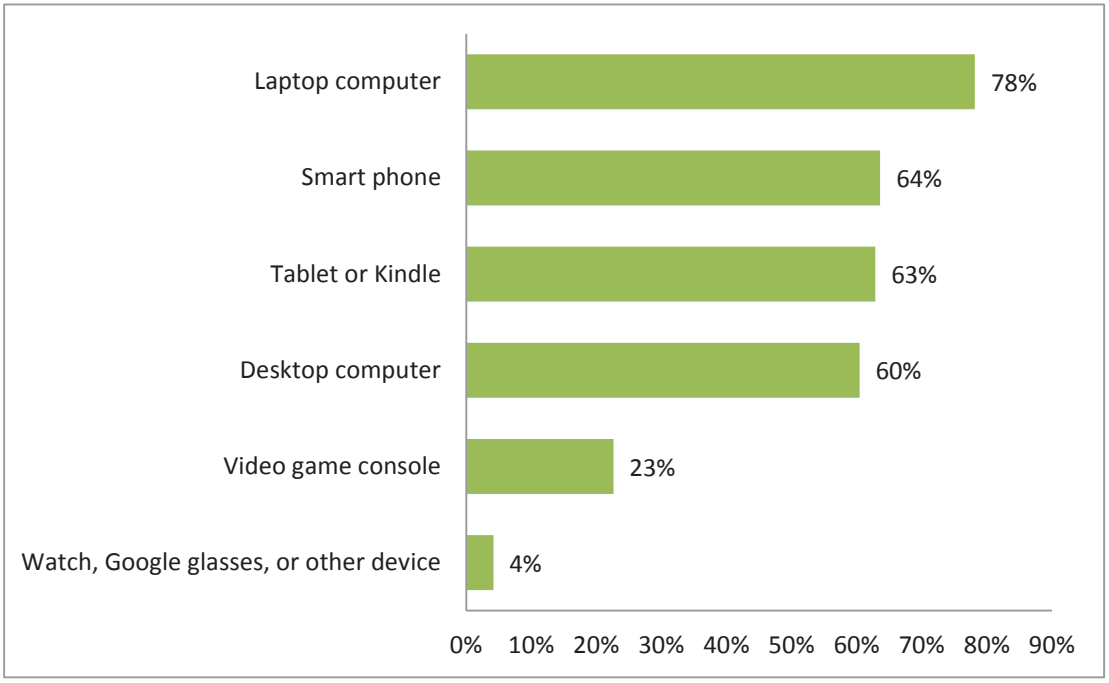


For the majority of households (74 percent), every member of the household uses the Internet, and 77 percent of respondents report using it daily—about the same as in the 2012 survey where 76 percent reported using the Internet daily. One small change is that respondents in the Northeast Kingdom and in Central Vermont are more likely to report using the Internet daily today than in 2012 (by magnitudes close to 10 percentage points). The most common reason why respondents do not use the Internet more frequently than they do is that they don't see a need for it.

[1] The difference between the percent who purchase broadband access at home (74 percent) and the percent that use the Internet at home (83 percent) is the result of residents receiving access at their home that they do not personally purchase, accessing the Internet with their smartphone data plans, and accessing the Internet with dial-up service.

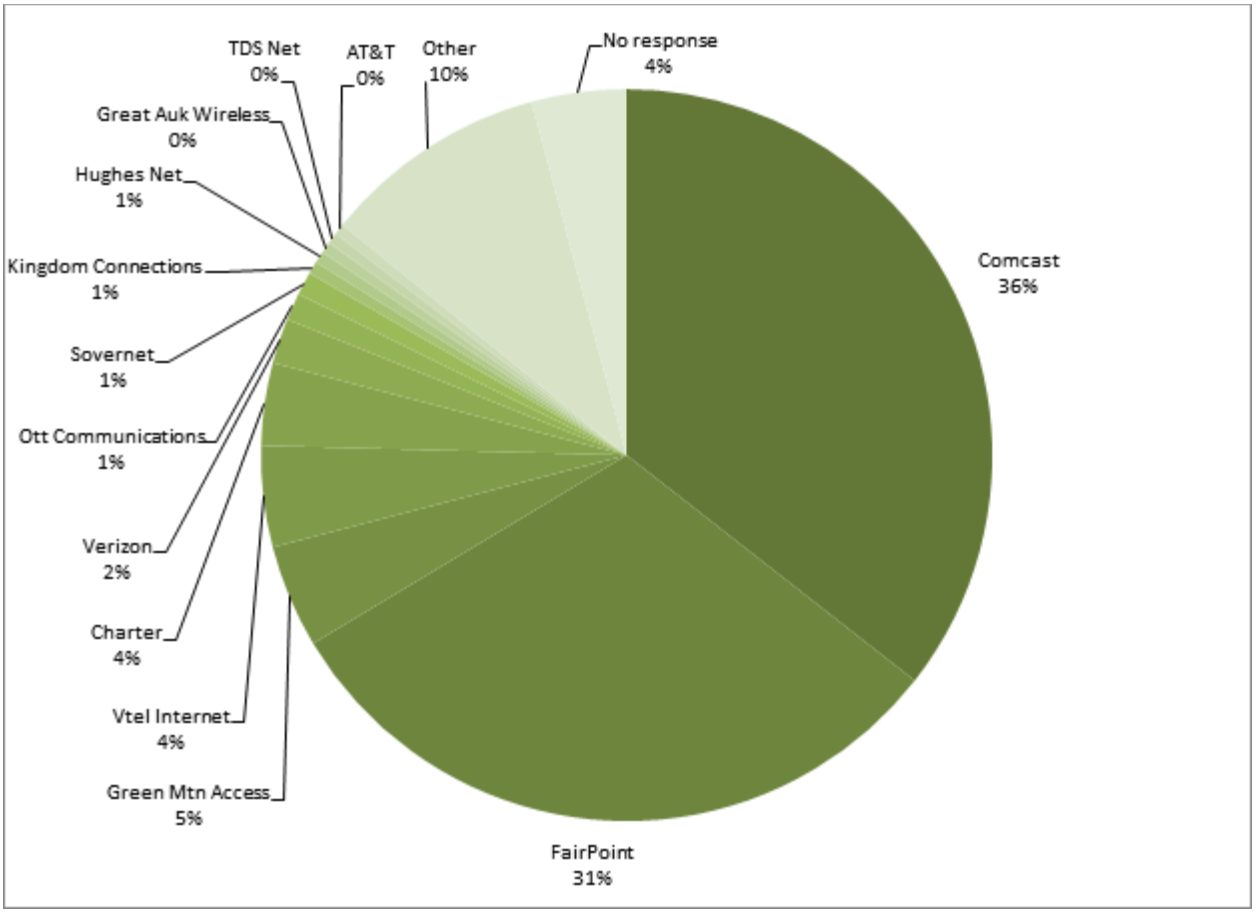
The most common device used at home to connect to the Internet is the laptop computer; 78 percent of households connect via laptops, followed by smart phones (64 percent), tablets or Kindles (63 percent), and desktop computers (60 percent). In 83 percent of the households surveyed, multiple members of the household connect to the Internet simultaneously over different devices.

Figure 3. Devices used to connect to the Internet at home



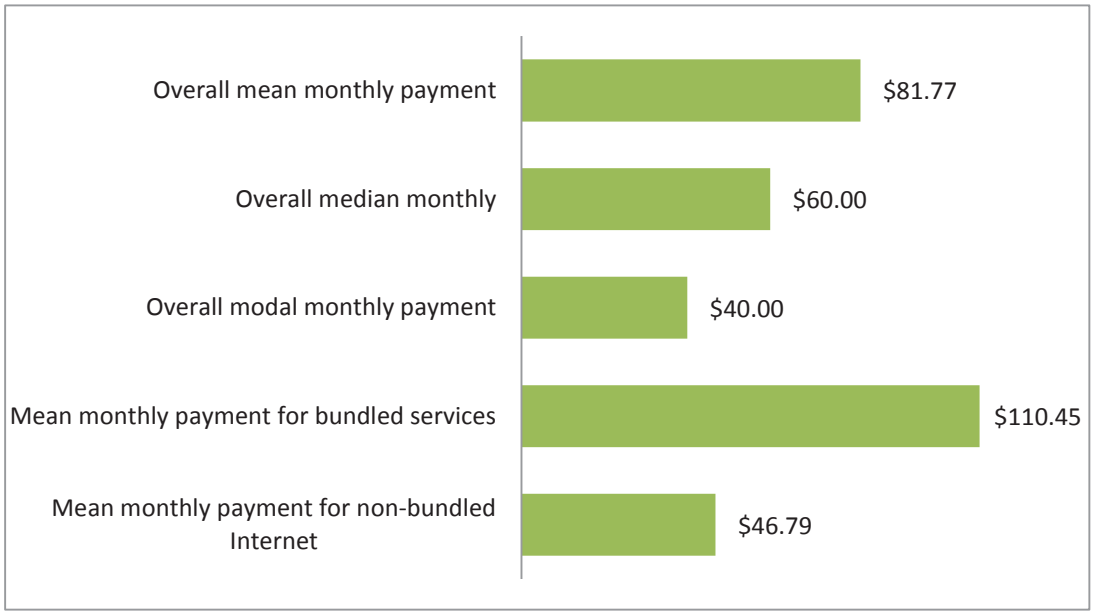
As in the past two surveys, Comcast and FairPoint are by far the most prevalent providers of Internet service to Vermont residents (used by 36 and 31 percent, respectively).

Figure 4. Estimated market share of the residential market for ISPs in Vermont



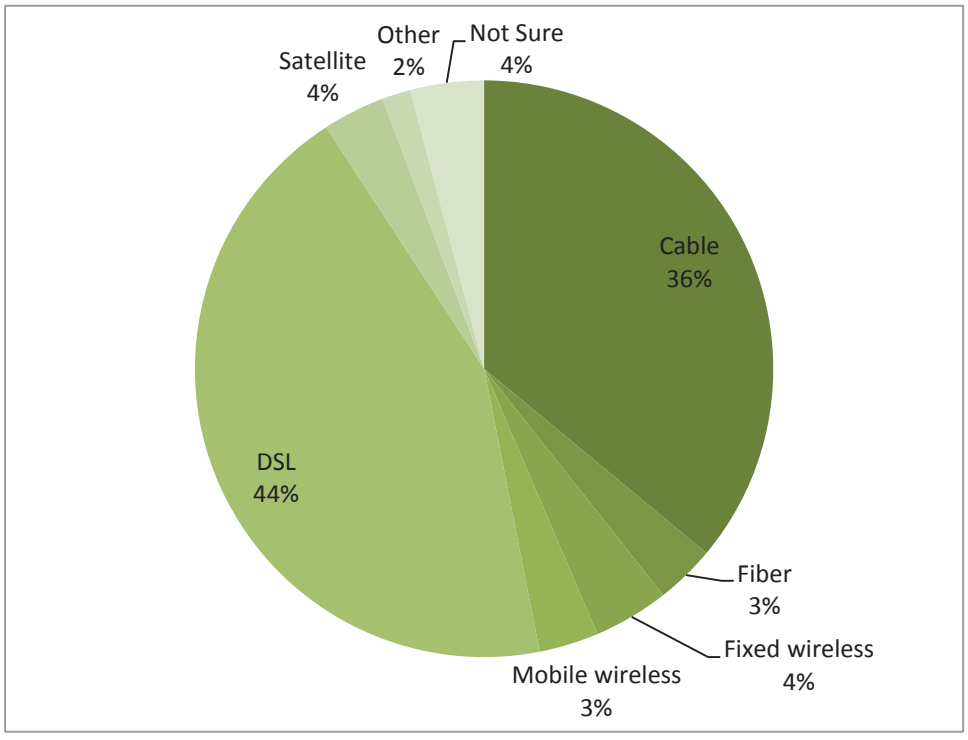
Vermonters, on average, report paying $81.77 for their Internet service—a 68 percent increase over the $48.54 average measured in the 2012 survey; however, the reported costs were often what is paid for bundled packages that include services beyond the provision of Internet access. When separating bundled packages from non-bundled, it appears that there have been little change in the cost since 2012, as illustrated by Figure 5. Half of all respondents pay $60 per month or less; the modal response was $40 per month. Forty-eight percent of those who purchase Internet service for the home have a bundled package.

Figure 5. Average monthly payment for Internet service



DSL and Cable are the two primary ways that Vermont residents connect to the Internet from their homes, with 44 percent connecting with DSL and 36 percent connecting with cable. Only 6 percent of Vermont households have a secondary means for accessing the Internet in the event that their primary source goes down.

Figure 6. Means of connecting to the Internet from home

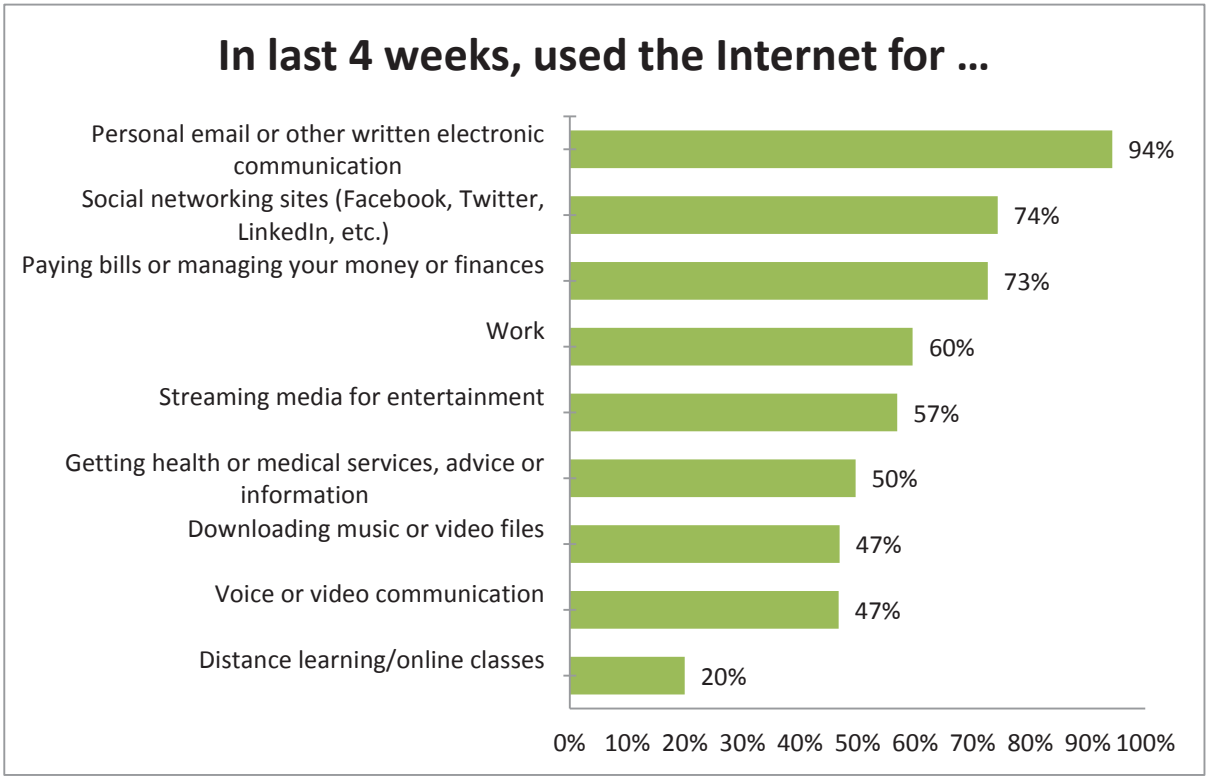


While only 3 percent of our survey respondents say that they connect to the web via fiber, 47 percent say that they would like to have a fiber connection to their home. Before asking respondents, interviewers noted the benefits of fiber in terms of speed. Of those who said that they would like to have a fiber connection, 26 percent said that they wouldn't pay more than they are currently paying for access to the Internet, but 11 percent said that they would pay an additional $5 per month, 22 percent said that they would pay and additional $10 per month, and 19 percent said that they would pay an additional $20 per month. Another 8 percent said that they would willingly pay $30 or $40 per month for the additional benefits of a fiber connection.

Sixteen percent of households that already have broadband Internet service to their homes say that they are likely to upgrade their service for faster speed in the next year.

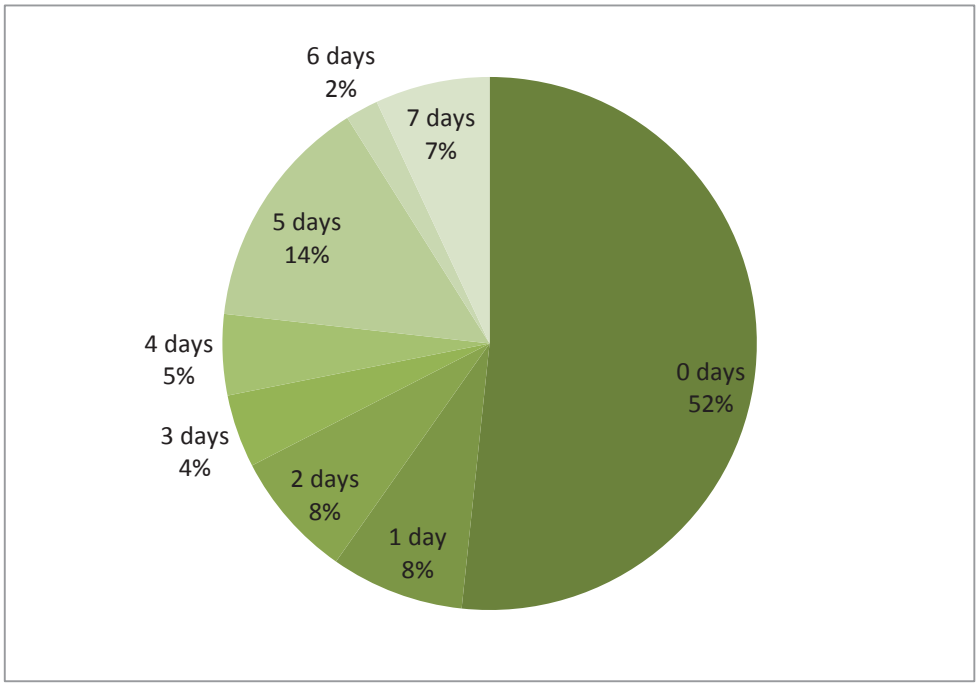
Email and other electronic communication are still the most common use of the Internet for Vermont residents; 96 percent used the Internet for email, same as in 2012. The percent that use the Internet for voice or video conferencing rose 25 percentage point since 2012, social networking rose 12 percentage points, and using the Internet for work rose by 10 percentage points since 2012.

Figure 7. How Vermont households use the Internet at home



Of those who work for pay, 52 percent did not work from a home office at all in the prior week, and 23 percent worked from a home office five or more days.

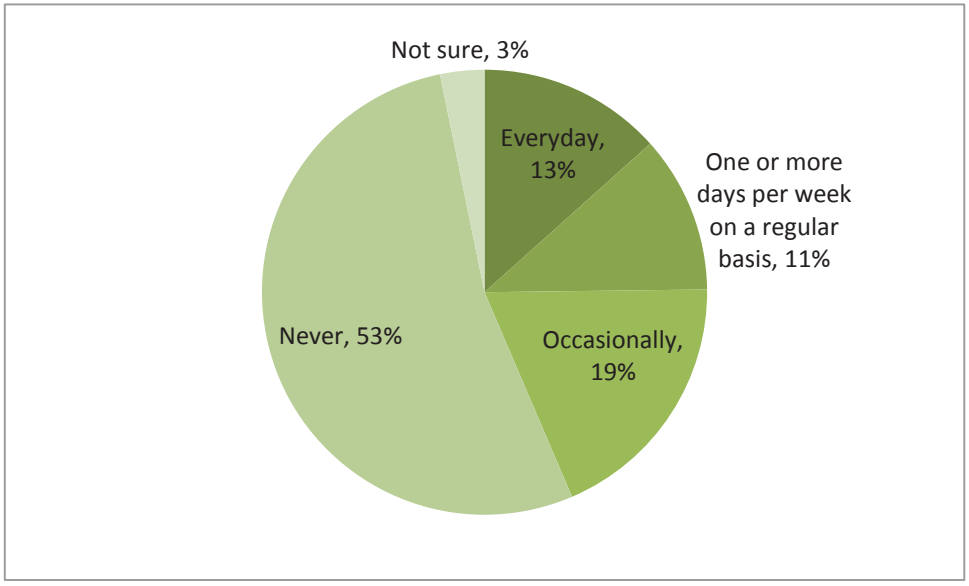
Figure 8. Number of days in the past week worked from home office



A majority of those who are in the workforce spend less than half of their time online or on the phone; in fact, 11 percent spend no time at work online or on the phone. On the other hand, 22 percent say that they spend most of their work time online or on the phone.

The majority of those in the workforce in our survey never telecommute, and of this group, 97 percent say that they will not be telecommuting in the near future.

Figure 9. Frequency of telecommuting for Vermont workers

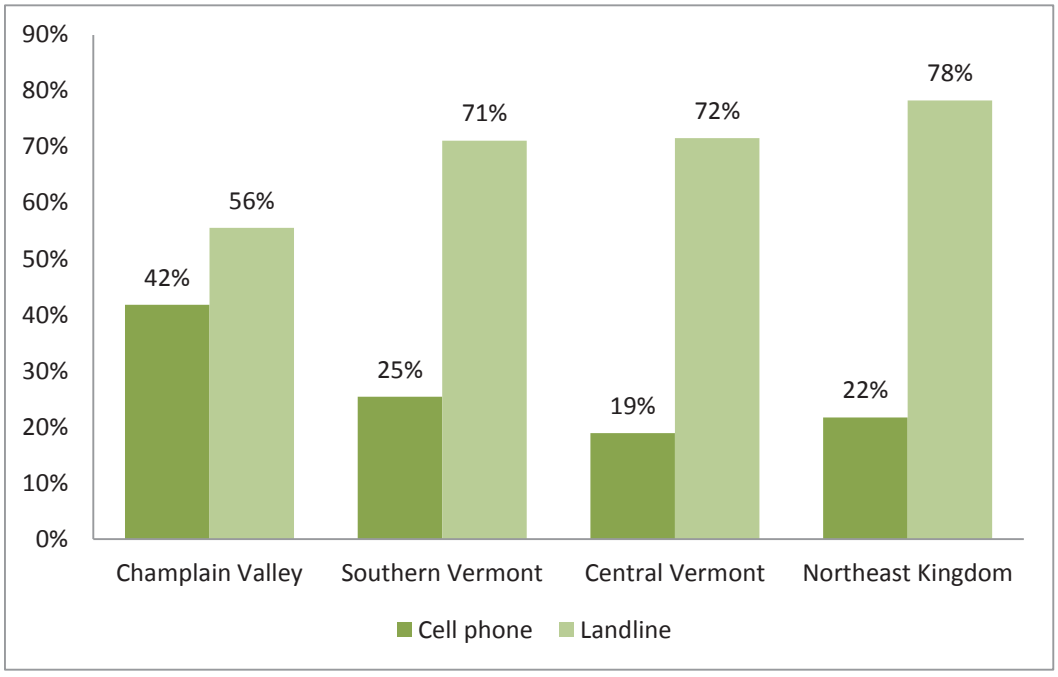


While 69 percent of respondents say that there are computers with free access to the Internet available in their community, only 20 percent of those with the resources in their communities have made use of them. Lastly, of the small group that have used the free access resources in their communities, 76 percent say that they have no trouble getting access to the computers when needed, although 45 percent also say that their community needs more terminals for public use.

Landline Telephone Service

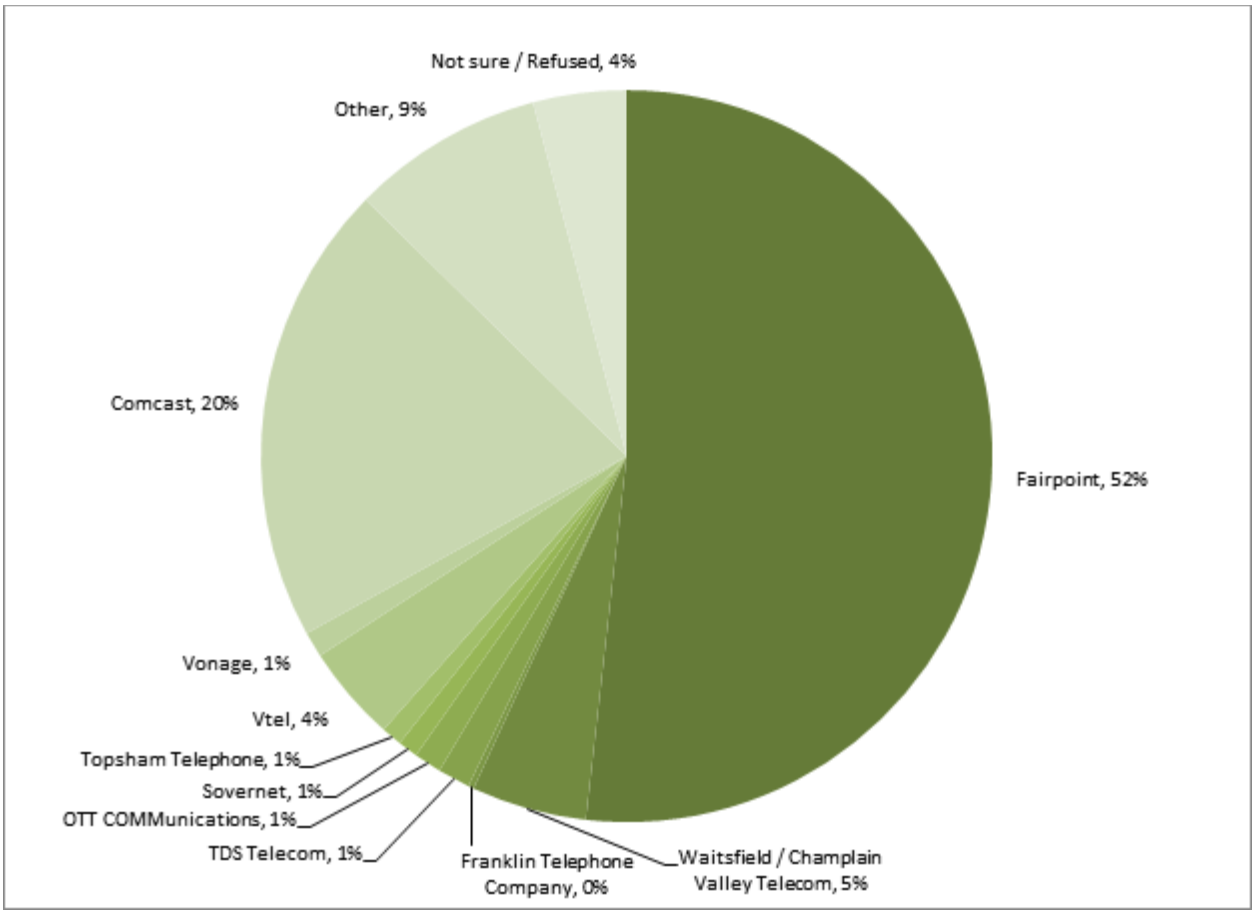
Nearly two-thirds of Vermont residents (66 percent) consider their landline to be their primary telephone service. Regionally, however, the picture looks very different. Only 56 percent of residents in the Champlain Valley consider their landline to be their primary phone, whereas landline is the primary service for more than 70 percent of the households in the other three regions (see Figure 10).

Figure 10. Primary Telephone Service, by Region



The most prevalent provider of landline service is FairPoint (52 percent of landline households), distantly followed by Comcast (20 percent of households). For comparison, the 2010 Vermont Telecommunications Survey Report showed FairPoint with 69 percent of the market. Figure 11 illustrates the estimated market share of residential landline service based on the data collected in 2014.

Figure 11. Residential telephone providers share of the residential market, from self reports

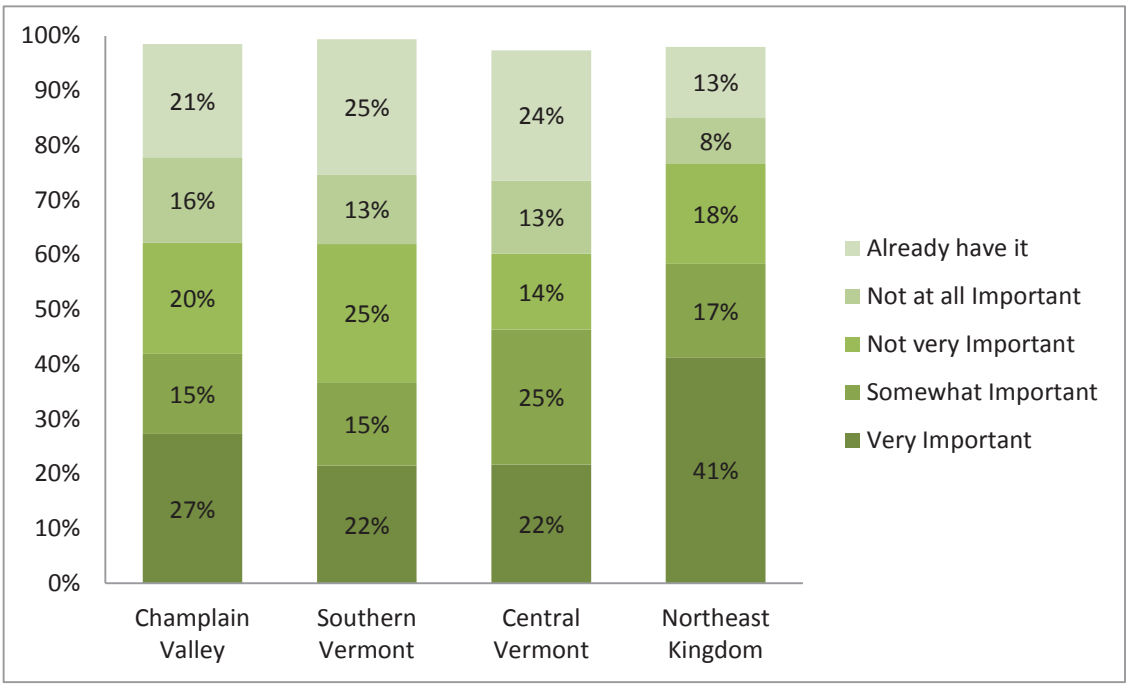


Overall, landline subscribers are very satisfied (47 percent) or satisfied (39 percent) with their local telephone provider, although only 37 percent of FairPoint's customers say that they are very satisfied. Ninety-five percent of landline customers are either very satisfied (40 percent) or satisfied (45 percent) with the products and service selections available from their provider, and 69 percent are either very satisfied (42 percent) or somewhat satisfied (27 percent) with the time it takes for their landline provider to resolve an issue. As far as the ease of understanding the monthly bill, 14 percent of the survey respondents say that it is either somewhat difficult (11 percent) or very difficult (3 percent) to understand the bill; a majority (54 percent) say that the bill is very easy to understand.

Toll calls present a larger problem for some Vermont residents than for others. Only 43 percent of all respondents say that it is either very important (26 percent) or somewhat important (17 percent) to have the entire state as a local calling area; however, in the Northeast Kingdom, 58 percent say that it is either very important (41 percent) or somewhat important (17 percent). Residents of the Northeast Kingdom are also the least likely to have a state-wide local calling area (22 percent for Vermonters generally, but only 13 percent of Northeast Kingdom households). Although only 23 percent of

respondents overall say that they would be willing to pay more for local service to have the entire state as their local calling area, 41 percent of those for whom it is very important say that they would pay an additional cost.

Figure 12. Importance of having the entire state as a local calling area, by region



The vast majority of landline customers do not expect to make any changes in their service in the near future. Only 5 percent said that they may drop a phone line in the next 6 months, and 3 percent said that they are likely to drop landline service completely in the next year.

All survey respondents were read the following statement and question: “Due to recent FCC changes, the Federal government will reduce financial support for telephone service for many high-cost rural areas. How important is it for the state to fund such high cost, rural service?” Phrased in a way that puts the burden on the state, 72 percent of respondents said that it is either very important (48 percent) or somewhat important (24 percent) for the state to fund high-cost rural service. Only 9 percent said that it was not very important

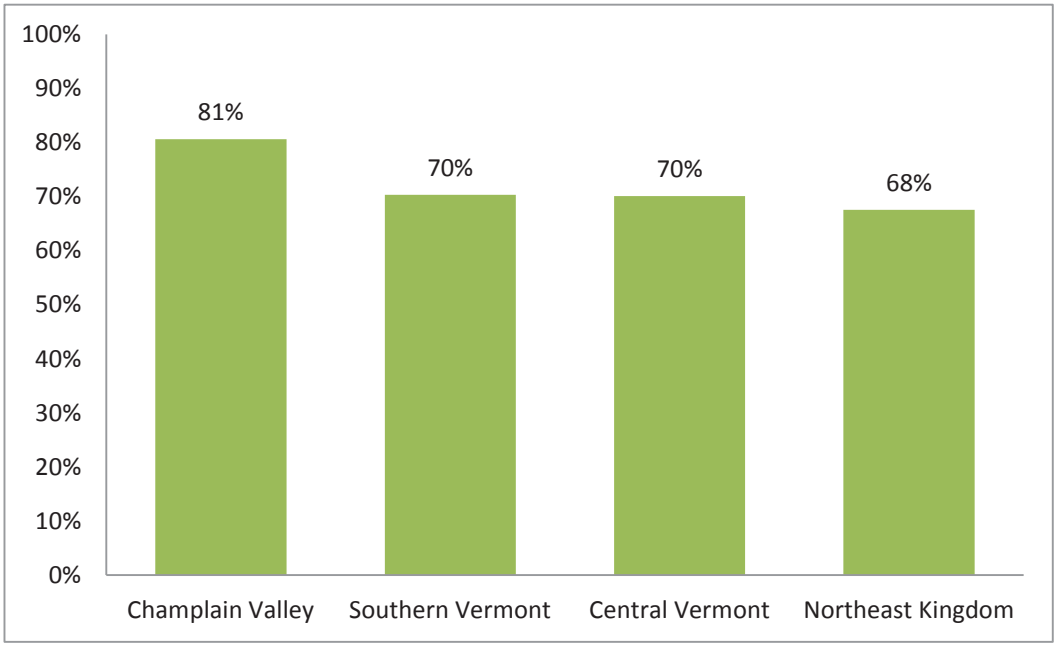
In addition, a plurality (45 percent) believes that telephone rates for all Vermonters should be increased in order to cover high-cost rural service, with 41 percent opposing any increase and 13 percent unsure. Phrased another way that puts the burden on rural rate payers, a slim majority (52 percent) disagree with the idea that rates for rural areas should be increased to offset the need to raise service charges on all Vermonters.

Table 1. Attitudes about sharing the burden of delivering telephone service to high-cost rural areas

	Yes	No	No opinion
Increase rates for all Vermonters to cover high cost, rural service	45%	41%	13%
Increase rates for rural residents to offset the need to raise service charges on all Vermonters	31%	52%	17%

About three-quarters of all landline customers in our sample also use a cell phone, although as Figure 13 illustrates, it does vary by region. Thirty-six percent of survey respondents receive the majority of their calls on their cell phone, while 60 percent receive the majority on a landline.

Figure 13. Percent of respondents with a landline phone who also use a cell phone, by region



Cell Phone Service

The vast majority of those without a cell phone (69 percent, n=120) say that they either do not need or do not want one for a wide variety of reasons; however, about 31 percent say that they do not own a cell phone because of the cost or the perception that the service (signal) is poor. The average number of cell phones per household in Vermont is 2.39, which is also about the average number of individuals per household.

Estimates from the National Health Statistics Report (No. 70, December 2013) put the percent of households in Vermont that are "cell phone only" at close to 30 percent.[2] The majority of cell-phone-only respondents in the 2014 Vermont residential survey who have dropped a landline in the past would never go back to a landline; 12 percent of cell-phone-only respondents have never had a landline.

The most prevalent provider of residential cell phone service in Vermont is Verizon, providing service to 45 percent of the cell phone users, followed by AT&T, providing service to 39 percent. Forty-five percent of AT&T subscribers are aware that Verizon provides service in their area, and 42 percent of Verizon subscribers are aware of AT&T in their area.

In addition to voice, 85 percent of Vermont residential cell phone users have plans that include texting, and 73 percent have plans that include data. Not surprisingly, data plans, and to a lesser extent texting plans, are more common with subscribers from wealthier households.

The average monthly cell phone bill, according to survey respondents, is $109.82.[3] Naturally, this amount varies by region and household income. The following figures illustrate those differences.

[2] The data in the National Health Statistics Report come from a number of sources, including the National Health Interview Survey (2007-2012), the U.S. Census Bureau's American Community Survey (2006-2011) and infoUSA.com consumer database (2007-2012). The model based on a longitudinal approach and large samples from the data sources used in the National Health Statistics Report generates the best estimates for wireless substitution rates in the states. The National Health Statistics Reports are produced by the Center for Disease Control and Prevention and the National Center for Health Statistics.
Nearly half (49 percent) of those we reached by cell phone in the Vermont Telecommunications survey did not have a landline at their residence, 12 percent of the overall sample.

[3] We tested to see if there was a difference in monthly costs between those who still have a landline and those who exclusively use cell phones, and the differences are not statistically significant (t=1.19, p<.236).

Figure 14. Average monthly cell phone bill, by region

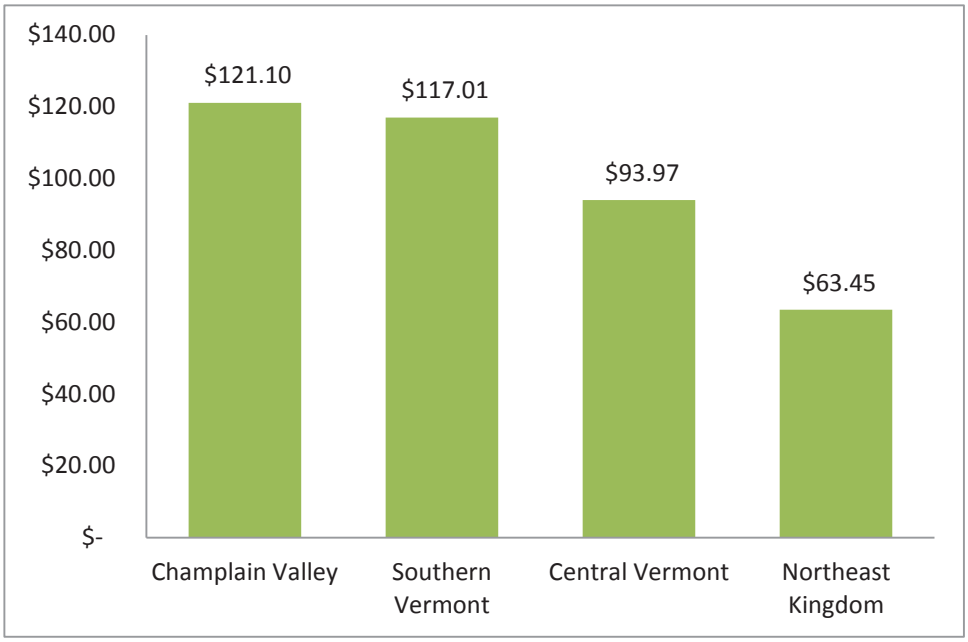
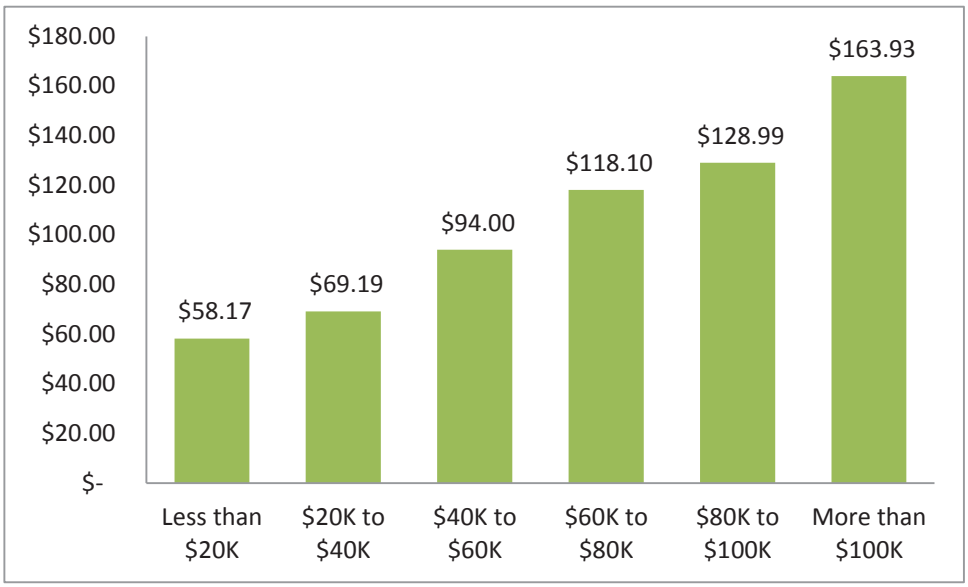
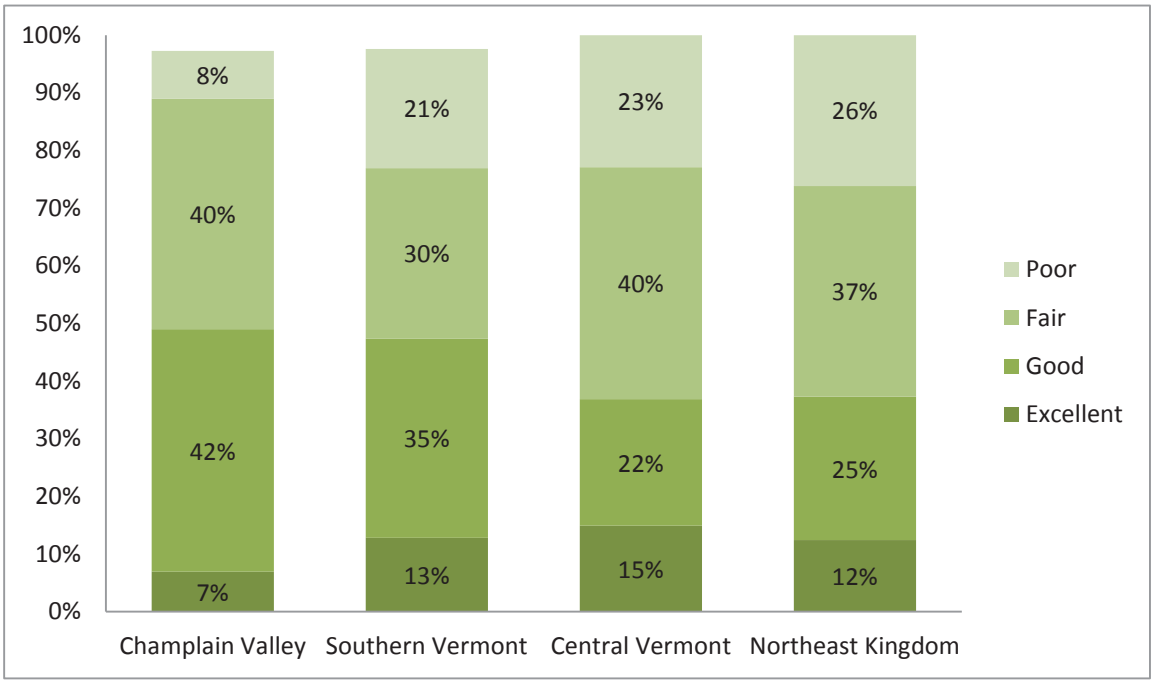


Figure 15. Average monthly cell phone bill, by household income



A slight majority of cell phone users rates the cell phone signal coverage across the state as either fair (37 percent) or poor (16 percent), while nearly as many rate service as either excellent (11 percent) or good (35 percent). Cell phone users in the Champlain Valley and Southern Vermont rate the coverage across the state more favorably than do those Central Vermont and in the Northeast Kingdom, as illustrated by Figure 16.

Figure 16. Rating the state-wide cell phone coverage, by region



A majority of cell phone users (57 percent) believe that where cell phone service is available, it is just as reliable as landline service, and 38 percent believe it is not as reliable. A vast majority of Vermonters (80 percent) favor adding more cell towers to increase coverage across the state. Support for adding cell towers is greatest in the Northeast Kingdom (93 percent). When it comes to adding towers, 43 percent prefer installing a large number of shorter towers to a smaller number of tall towers (33 percent); 17 percent are ambivalent about the types of towers. Eighty-five percent of Vermonters support building more towers "if it were necessary to improve two-way mobile radio communications for police, ambulance, or fire services."

About three in ten Vermonters (29 percent) have used telephone service provided by a cable company. The most prevalent provider of this service is Comcast, providing to 79 percent of those who have used it; Charter provided the service to 6 percent.

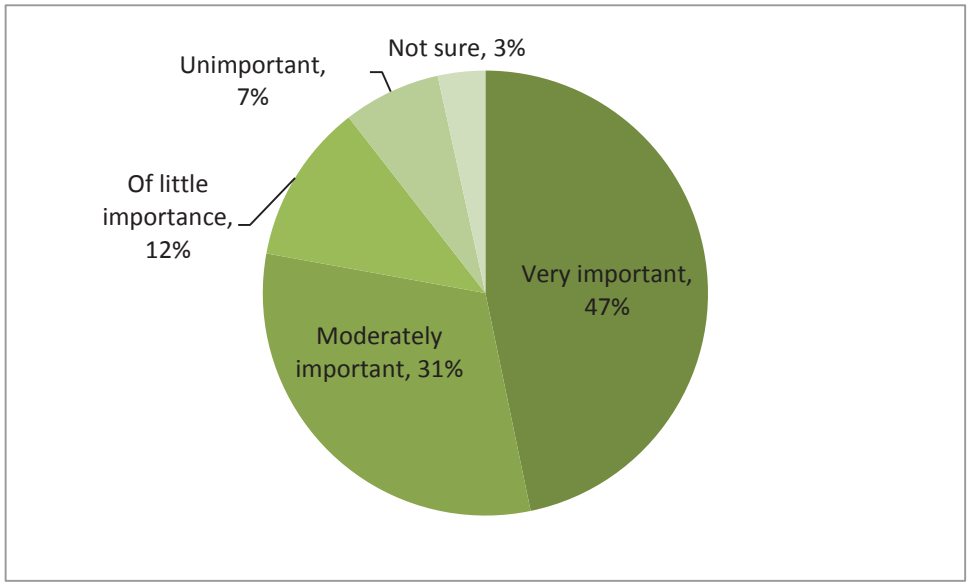
Nomadic VoIP is popular among Vermont adults younger than 55. Overall, 42 percent of Vermonters say that they have used a Nomadic VoIP service to make calls, but among those under 55 years old, a majority used Nomadic VoIP services. Among those who have used Nomadic VoIP, 68 percent have used video chat through that service.

Television Services

On average, survey respondents have two televisions in their respective homes. A plurality of Vermonters (42 percent) get their TV service through cable; another 34 percent subscribe to satellite service, 9 percent get access through Internet TV, and 5 percent use a broadcast antenna. More than two-thirds of respondents with TVs in the home (68 percent) say that they have watched a public access channel, although the majority (52 percent) have watched less than an hour per week in the last year, and 28 percent say that they watched one to two hours per week. Of those who have watched a public access channel, 28 percent say that they have watched a town meeting on at least one occasion.

Regardless of the extent to which Vermonters watch public access channels, there is support for the value of having them. Of those who have watched public access television, just shy of a majority (47 percent) say that it is very important to have them available, and another 31 percent say that it is moderately important to have them available.

Figure 17. Importance of public access channels, as judged by those who have watched them



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Demographics

The sample demographics skew more female and older than the general population, but these data have been weighted to reflect household characteristics in terms of income and regions. All 14 counties in the state are represented proportional to their population size. The tables below show the distribution of select demographics.

Gender of respondent		
Male	204	41%
Female	300	59%

Education level of respondent		
Less than HS	15	3%
HS diploma	137	27%
Some college	81	16%
College degree	157	31%
Some post-graduate work	18	3%
Post-graduate degree	92	18%

Age of respondent		
18 - 24	18	4%
25 - 34	36	7%
35 - 44	50	10%
45 - 54	86	17%
55 - 64	123	25%
65 or older	185	37%

Household income		
Less than $20K	36	8%
$20K to $40K	96	22%
$40K to $60K	90	21%
$60K to $80K	86	20%
$80K to $100K	41	9%
More than $100K	83	19%

List of Acronyms

ACCD	Vermont Agency of Commerce and Community Development
AHS	Vermont Agency of Human Services
AMO	Access Management Organizations
ANI	Automatic Number Identification
ASL	American Sign Language
CAPI	Consumer Affairs and Public Information Division, Vermont Department of Public Service
CDMA	Code Division Multiple Access
CIO	Chief Information Officer
CLEC	Competitive Local Exchange Carrier
CPG	Certificates of Public Good
CPNI	Customer Proprietary Network Information
CVPS	Central Vermont Public Service Corporation
DII	Vermont Department of Information and Innovation
DOCSIS	Data Over Cable Service Interface Specification
DOL	Vermont Department of Libraries
DPS	Vermont Department of Public Safety
DSL	Digital Subscriber Line
EAS	Extended Area Service
EDA	U.S. Department of Commerce Economic Development Administration
ETC	Eligible Telecommunications Carrier
FAHC	Fletcher Allen Health Care
FCC	Federal Communications Commission
FTTH	Fiber-To-The-Home (also referred to as fiber-to-the-premises
FTTP	Fiber-to-the-Premises
FX	Foreign Exchange
GIS	Geographic Information Systems
GMP	Green Mountain Power
GSM	Global Standard for Mobile Communications
HDTV	High-Definition Television
ILEC	Incumbent Local Exchange Carrier
IM	Instant Messaging
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IT	Information Technology
ITC	Independent Telephone Company
ITU	International Telecommunications Union
LAN	Local Area Network
LEC	Local Exchange Carriers
LMS	Local Measured Service
LNP	Local Number Portability
NANPA	North American Numbering Plan Administrator
NECA	National Exchange Carrier Association
NENA	National Emergency Number Association
NPA	Numbering Plan Area
ONU	Optical Network Units
PBX	Private Branch Exchange
PCS	Personal Communications Service
PEG	Public, Educational, and Governmental
PON	Passive Optical Network
PSAP	Public Safety Answering Point
PSB	Vermont Public Service Board
PSD	Vermont Public Service Department
PSTN	Public Switched Telephone Network
RBOC	Regional Bell Operating Company
RFI	Request for Information
RFP	Request for Proposals
ROW	Right-of-Way
RPC	Regional Planning Commission
RUS	Rural Utilities Service

SLC	Subscriber Line Charge
TCP/IP	Transmission Control Protocol / Internet Protocol
TDMA	Time Division Multiple Access
TELRIC	Total Element Long-Run Incremental Cost
TTY	Text Telephone
UNE	Unbundled Network Element
USF	Universal Service Fund
UVM	University of Vermont
VAN	Vermont Access Network
VCRD	Vermont Council on Rural Development
VDH	Vermont Department of Health
VEDA	Vermont Economic Development Authority
VI	Vermont Institutes
VIBRS	Vermont Incident Based Reporting System
VIT	Vermont Interactive Television
VITC	Vermont Information Technology Center
VMEC	Vermont Manufacturing Extension Center
VOD	Video on Demand
VoIP	Voice over Internet Protocol
VON	Voice on the Net
VPN	Virtual Private Network
VTAC	Vermont Telecommunications Advancement Center
VTrans	Vermont Agency of Transportation
VTRS	Vermont Telecommunications Relay Service
WAN	Wide Area Network
WISP	Wireless Internet Service Provider

Glossary of Terms

Access charge	A charge paid by long distance carriers to local exchange providers for use of local facilities in routing long distance calls.
Access line	A circuit between a subscriber and the central office that serves it.
Bit (Binary digit)	The smallest unit of information a computer can use. A bit is represented as a 0 or a 1 (also “on” or “off”). A group of 8 bits is “ called a byte. Bits are often used to measure the speed of digital transmission systems.
Alternative regulation	A family of regulatory techniques that relax traditional rate-of-return regulation in favor of regulation by objectives such as price, service quality, or introduction of services.
Asynchronous Transfer Mode (ATM)	A type of fast packet data service that is specially designed to predictably manage multiple types of data streams, including ones with strict quality-of-service requirements like video and voice.
Broadband	A family of services that provide users with high-speed data communications. In some contexts, broadband is defined as services with an ability to transmit data at greater than specific rates measured in kbps or Mbps.
Byte	Eight bits of information composed of zeros or ones, one of which may include a parity bit. A byte is to a bit what a word is to a character.
Cable modem	A device for transmitting and receiving digital data over a cable television network. Used to deliver broadband (and sometimes telephone) service over cable networks.
Code Division Multiple Access (CDMA)	One of several digital mobile wireless telephone and data standards used in the U.S.

Central office	The telephone company facilities that house switching and related equipment to serve the immediate geographical area. The central office is the most immediate point of interface between the telephone company and customers.
Certificate of public good (CPG)	The permission required from and granted by the State of Vermont to allow a utility or regulated industry, such as a cable company, to do business and serve subscribers in Vermont.
Competitive Local Exchange Carrier (CLEC)	A non-incumbent LEC. See also Local Exchange Carrier, Incumbent Local Exchange Carrier.
Customer proprietary network information (CPNI)	Information about a customer's calling patterns and other personal information that technologies now enable telephone companies to collect.
Dial tone line rate	The basic monthly charge under measured service for access to the telephone network. A charge related to usage is charged as well.
Digital signature	A form of encryption technology that can be used to scramble a message before transmission so as to secure it during transit and prevent anyone but the intended recipient from unscrambling it to retrieve the "information in the message. Additionally, the use of digital signatures enables " the sender's identity to be verified by the recipient.
Digital Subscriber Line (DSL)	A family of technologies that extends the ability of copper telephone lines to carry high-speed data telecommunications over short and medium range distances.
Digital Video Recorder (DVR)	See Personal Video Recorder.
Distance learning	Interactive instruction or training services conducted among remote participants from distributed sites. Audio, visual, data telecommunications devices and related systems are employed. There are many distance learning models; traditional lecture format, remote students with a teacher at a central location, and cooperative learning arrangements involving multiple connections of small groups from various locations.
DS-1	A type of digital service transmitting voice or data at 1.544 Mbps. Sometimes used as a synonym for a T-1 (see also T-1, below). Where distinguished from one another, a DS-1 generally refers to the service, while T-1 refers to the facility carrying the service.
Eligible Telecommunications Carrier (ETC)	A telecommunications carrier that qualifies and has been designated to receive high-cost support from the Federal Universal Service Fund.
Ethernet	The dominant computer networking protocol for Local Area Networks that is often used in the networks of telecommunications carriers.
Exchange	A geographical unit, served by one or more central offices, established for the administration of uniform rates for communications service within that area. Vermont is currently served by 141 exchanges.
Federal Communications Commission (FCC)	A board of five commissioners appointed by the President and confirmed by the Senate in accordance with the 1934 Communications Act. The FCC has the power to regulate interstate and foreign communications originating in the United States by wire and radio.

Fiber optics	Hair-thin glass fibers that transmit light waves capable of carrying enormous amounts of information.
Franchise area	The geographic region in which the PSB or FCC has granted a public service company the authority to offer specific types of service.
Gigabit	One billion bits.
General Packet Radio Service (GPRS)	A mobile wireless communications protocol related to GSM used to provide mobile data services.
Global Standard for Mobile Communications (GSM)	One of several digital mobile wireless telephone standards used in the U.S. and the dominant standard throughout Europe and much of the world.
Head end	The originating point of a signal in cable TV systems.
Incumbent Local Exchange Carrier (ILEC)	A local telephone company that was in operation prior to the advent of competition for telephone service, or a successor to such a company.
Independent phone company	In Vermont, an ILEC other than Verizon.
Kbps	Kilobits per second, a unit of data transfer speed.
Kilobit	One thousand binary digits or bits.
Local area network (LAN)	A private communications network linking terminals and computers in a specific area, such as an office or home.
Local exchange carrier (LEC)	A telecommunications company that provides local telephone or data telecommunications service; distinguished from long-distance or interexchange carriers by the fact that they provide the links to consumers at their homes or businesses.
Local loop	The part of the telephone network, i.e., the wires, between a central office and a customer's premise.
Local measured service (LMS)	Local service for which a customer pays a flat dial tone line rate for access to the telephone network, plus a usage charge for each minute of local calling.
Locality	A border area of Vermont that is serviced by a telephone central office in another state.
Mbps	Megabits per second, a unit of data transfer speed.
Megabit	One million binary digits or bits.
Megabyte	A unit of measurement for data storage equal to one million bytes or precisely 1,048,576 bytes; often used as a unit of measurement in describing memory capacity of computer disks and drives.
Microwave	In communications, an atmospheric transmission method using high radio frequencies to transmit analog or digital voice, data, or video signals between antennas or on satellite links.
Personal Communications Service (PCS)	A digital cellular technology providing voice, video, and data services. Uses a higher frequency band than traditional cellular services, limiting the range of signals, but which offers greater bandwidth than the traditional cellular bands.

Plain old telephone service (POTS)	A term used to identify basic voice phone service.
Public Switched Telephone Network (PSTN)	A term used to denote the interconnected networks of many carriers that collectively to provide telephone services to the public. Sometimes used as a term to distinguish these networks from other networks, such as the Internet or private communications networks.
Private branch exchange (PBX)	A private switching system on the customer's premises, which switches calls between phones in the office and to or from the outside phone network.
Public, education, and government (PEG) access channels	The 1984 Cable Act established that access to local cable television franchises are provided to communities who want them. Public, education, and government are three types of "public access" channels.
Public safety answering point (PSAP)	Local, state, or regional center for answering 9-1-1 calls. It may or may not be the dispatch center.
Regional Bell Operating Company (RBOC)	Seven RBOCs were created by the breakup of the Bell System (AT&T) in 1984. These were Bell Atlantic, Bell South, NYNEX, Ameritech, USWest, Pacific Tellsis, and Southwestern Bell. After a series of mergers and acquisitions, four remain: Verizon, SBC, Qwest, and Bell South.
T-1	A type of digital carrier system transmitting voice or data at 1.544 Mbps.
Tariff	The published rates, regulations, and descriptions governing provision of a regulated public service such as telecommunications services.
Telework	Sometimes used as a synonym for "telecommuting," and sometimes used as a broader term to encompass telecommuting plus other situations where telecommunications enables work to be done at a distance, whether or not it displaces a traditional commute.
Terrabit	One trillion bits.
Unbundled Network Element (UNE)	A particular piece of an ILEC's network (such as the local loop, switching, or transport facilities between central offices) sold at wholesale rates to a CLEC. Pronounced "yoo-nee."
Unbundling	Separating out for individual sale a particular service or element of a network that is commonly sold together with other elements or services.
Video on Demand (VOD)	A cable TV service that allows a cable subscriber to select a program and have it delivered over the cable network at a time of the subscriber's choosing. Typically the service also allows the subscriber to fast forward, rewind, and pause the program.
Virtual Private Network (VPN)	Emulation of dedicated private data circuits over a shared data network, often over the Internet.
Voice over Internet Internet Protocol (VoIP)	Transporting digitized voice communication over private networks that use Protocol or over the public Internet. Frequently, but not always, the service provides telephone or telephone-like communication, and may enable communication with users on the PSTN.
Wi-Fi	The popular name for an industry standard used for providing wireless local area networks (LANs) over license-free wireless spectrum.

Prepared by the Department of Public Service
112 State Street
Montpelier, VT 05620-2601
(802) 828-2811
TTY (VT): 800-734-8390
psd.telecom@state.vt.us
http://publicservice.vermont.gov

VERMONT